SAMPLING AND ANALYSIS PLAN
UFP-QAPP – Revision 0
Field Sampling Plan – Revision 0

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
OPERABLE UNIT 2 – SOIL REMEDIATION
SOUTH PLAINFIELD, NEW JERSEY

CONTRACT # W912DQ-04-D-0023
DELIVERY ORDER #0005

Prepared By:

SEVENSON ENVIRONMENTAL SERVICES, INC.
2749 Lockport Road
Niagara Falls, NY 14305

OCTOBER 2008

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
OPERABLE UNIT 2 – SOIL REMEDIATION
SOUTH PLAINFIELD, NEW JERSEY

SAMPLING AND ANALYSIS PLAN

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QUALITY ASSURANCE PROJECT PLAN – REVISION 0

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
OPERABLE UNIT 2 – SOIL REMEDIATION
SOUTH PLAINFIELD, NEW JERSEY

Prepared by:
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Based on the Intergovernmental Data Quality Task Force
Uniform Federal Policy for Quality Assurance Project Plans
(Final Version 1, March 2005)

Original Submittal: October 31, 2008

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LIST OF ABBREVIATIONS AND ACRONYMS

AA	Atomic Absorption
ANSETS	Analytical Services Tracking System
ASR	Analytical Services Request
CIH	Certified Industrial Hygienist
CLP	Contract Laboratory Program
COC	Chain of Custody
CQCSM	Contractor Quality Control Systems Manager
DESA	Division of Environmental Science and Assessment
DOD	Department of Defense
FSP	Field Sampling Plan
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectroscopy
ICP	Inductively Coupled Plasma
IGWSCC	Impact to Groundwater Soil Cleanup Criteria
LCS	Laboratory Control Sample
LIMS	Laboratory Information Management System
LTTD	Low Temperature Thermal Desorption
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NELAP	National Environmental Laboratory Accreditation Program
OSHA	Occupational Safety and Health Administration
OU-2	Operable Unit 2
PCB	Polychlorinated Biphenyl
PDI	Pre-Design Investigation
ppb	Parts Per Billion
ppm	Parts Per Million
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCSR	Quality Control Summary Report
QL	Quantitation Limit
RCRA	Resource Conservation and Recovery Act
RDCSCC	Residential Direct Contact Soil Cleanup Criteria
RL	Reporting Limit
ROD	Record of Decision
RPD	Relative Percent Difference
RSCC	Regional Sample Control Coordinator
SDG	Sample Delivery Group
SOP	Standard Operating Procedure
SOW	Scope of Work
SSHERP	Site Safety, Health, and Emergency Response Plan
SSHO	Site Safety and Health Officer
SVOC	Semi-Volatile Organic Compound
TCLP	Toxicity Characteristic Leachate Procedure
TEF	Toxic Equivalency Factor
TEQ	Toxic Equivalent
TSCA	Toxic Substance Control Act
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WHO	World Health Organization
Yd^3	Cubic Yard

INTRODUCTION

Project Background

The Cornell-Dubilier Electronics Superfund Site (the site) is located at 333 Hamilton Boulevard in South Plainfield, Middlesex County, New Jersey. A site location map is included in Appendix 1. The United States Environmental Protection Agency (USEPA) assigned identification number NJD981557879 to the site.

The site consists of approximately 26 acres including the Hamilton Industrial Park, contaminated portions of the Bound Brook adjacent to and downstream of the industrial park, and contaminated residential, municipal, and commercial properties in the vicinity of the former Cornell-Dubilier Electronics Corporation, Inc. facility. Former buildings on the site have been demolished and their footprints covered with temporary asphalt pavement. The only remaining building at the site is a water tower, which is to be protected during the performance of the work. The site is bounded by the Lehigh Valley Railroad to the northeast, Factory Street to the southeast, Spicer Avenue to the southwest, and by Hamilton Boulevard. The area is a busy, heavily developed, mixed-use neighborhood.

The developed portion of the facility (i.e., the northwest portion) comprises approximately 45 percent of the total land area which formerly contained buildings, a system of catch basins to channel storm water flow, and paved roadways. Several of the catch basins drain into a storm water collection systems whose outfalls discharge at various locations along Bound Brook. The other 55 percent of the property is predominantly vegetated. The central part of the undeveloped portion is primarily an open field, with some wooded areas to the northeast and south, and a deteriorated, partially paved area in the middle. The northeast and southeast boundaries consist primarily of wetland areas adjacent to Bound Brook, which flows from the eastern corner across the northeastern border of the undeveloped portion of the facility.

The site remediation was separated into multiple Operable Units. The scope of the current remedial action is Operable Unit 2 (OU-2), specifically remediation of contaminated site soils. The response action selected in the Record of Decision (ROD) dated September 2004 for OU-2 soils includes:

- Excavation of an estimated 107,000 cubic yards (yd^3) of contaminated soil containing polychlorinated biphenyls (PCBs) at concentrations greater than 500 parts per million (ppm) and contaminated soils that exceed New Jersey's Impact to Groundwater Soil Cleanup Criteria (IGWSCC) for contaminants other than PCBs. A map showing the approximate limits of contamination is included in Appendix 1.
- Onsite treatment of excavated soils amendable to treatment by low temperature thermal desorption (LTTD), followed by backfilling of excavated areas with treated soils.
- Transportation of contaminated soil and debris not suitable for LTTD treatment to an offsite facility for disposal, with treatment as necessary.
- Installation of a multi-layer cap or hardscape.
- Installation of engineering controls.
- Property restoration.
- Implementation of institutional controls.

The purpose of this Quality Assurance Project Plane (QAPP) is to provide procedures for the collection, analysis, and evaluation of data for the OU-2 soils in accordance with the response action selected in the ROD.

Site History and Contaminants

Cornell-Dubilier Electronics manufactured electronic parts and components, including capacitors, from 1936 to 1962. PCBs and chlorinated organic degreasing solvents were used in the manufacturing process. It is alleged that during the period of operation, Cornell-Dubilier Electronics dumped PCB-contaminated materials and other hazardous substances directly onto site soils. A former employee has claimed that the rear of the property was saturated with transformer oils and that capacitors were also buried behind the facility during the same time period (Foster Wheeler, 2002). Based on historic site practices, portions of the site have the potential to be contaminated with volatile organic compounds (VOCs; primarily trichloroethene and dechlorination products), PCBs, dioxins, metals (primarily mercury and lead), and other constituents of potential concern.

Site Specific Definition of the Problem

Work is being conducted at the Cornell-Dubilier Electronics Superfund Site due to contamination found in soil associated with past industrial operations conducted at the site. Sevenson will be responsible for removal of contaminated soil based upon the predetermined limits of exacavation; treatment of excavated soils amenable to LTTD; backfilling of excavations with either LTTD treated soils or offsite materials; transportation of all soil and debris which cannot be treated onsite to an offsite disposal facility; site restoration and implementation of appropriate site controls; and other activities necessary for complete and proper remediation of the site.

QAPP Worksheet #1
Title and Approval Page

Site Name/Project Name: Cornell-Dubilier Electronics Superfund Site

Site Location: South Plainfield, New Jersey

Document Title: Quality Assurance Project Plan for Cornell-Dubilier Electronics Superfund Site, Operable Unit 2 - Soil Remediation

Lead Organization: USACE – Kansas City District and USEPA Region II

Preparer's Name and Organizational Affiliation: Jennifer Singer, Sevenson Environmental Services, Inc.

Preparer's Address, Telephone Number, and E-mail Address: 2749 Lockport Road, Niagara Falls, New York 14305; (716) 284-0431; jsinger@sevenson.com

Preparation Date: October 31, 2008

Contractor's Project Manager: 4 Nov. 08
Signature, Date
Kim Lickfield, Sevenson Environmental Services, Inc.

Contractor's Project QA Officer: 11/4/08
Signature, Date
William Zambrana, Sevenson Environmental Services, Inc.

Lead Organization's Project Manager: _____
Signature, Date
Ken Mass, USACE

Approval Signatures: _____
Signature, Date
Pete Mannino, USEPA

Other Approval Signatures: _____
Signature, Date
_____
Printed Name/Title/Organization

_____
Signature, Date
_____
Printed Name/Title/Organization

_____
Signature, Date
_____
Printed Name/Title/Organization

QAPP Worksheet #2
QAPP Identifying Information

Site Name/Project Name: Cornell-Dubilier Electronics Superfund Site

Site Location: South Plainfield, New Jersey

Site Number/Code: NJD981557879

Operable Unit: OU2 – Soil Remediation

Contractor Name: Sevenson Environmental Services, Inc.

Contractor Number: W912DQ-04-D-0023

Contract Title: Small Business Northwest Division and Region II PRAC

Work Assignment Number: Delivery Order #0005

1. Identify guidance used to prepare QAPP:
Uniform Federal Policy for Quality Assurance Project Plans, Final Version 1, March 2005

2. Identify regulatory program:
USEPA Region II, Superfund

3. Identify approval entity:
USEPA Region II, USACE-Kansas City District

4. Indicate whether the QAPP is a generic or a project-specific QAPP.

5. List dates of scoping sessions that were held:

6. List dates and titles of QAPP documents written for previous site work, if applicable:
Quality Assurance Project Plan – OU2, Cluster 12 (Sevenson, November 2006)
Quality Assurance Project Plan – OU2, Cluster 12, Revision 1 (Sevenson, December 2006)
Quality Assurance Project Plan – OU2, Cluster 12, Revision 2 (Sevenson, December 2006)
UFP-QAPP – OU-2, Building Demolition (Sevenson, April 2007)

7. List organizational partners (stakeholders) and connection with lead organization:
The project organizational partners include representatives from USEPA Region II, United States Army Corps of Engineers (USACE) – Kansas City District, and Sevenson Environmental Services, Inc. (Sevenson). The USEPA and USACE will provide project and contract management guidance to Sevenson. Sevenson will be the primary contractor and will be responsible for developing and implementing the remedial action and will provide project management to any other subcontractors.

8. List data users:
USEPA Region II, USACE – Kansas City District, New Jersey Department of Environmental Protection (NJDEP), Sevenson

9. If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the attached table. Provide an explanation for their exclusion below:
Field Instrumentation – no field measurements will be made

Required QAPP Element(s) and Corresponding QAPP Section(s)	QAPP Worksheet # in QAPP Workbook	Required Information
Project Management and Objectives		
2.1 Title and Approval Page	1	- Title and Approval Page
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	2	- Table of Contents - QAPP Identifying Information
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	3 4	- Distribution List - Project Personnel Sign-Off Sheet
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	5 6 7 8	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications Table - Special Personnel Training Requirements Table
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	9 10	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)
2.6 Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	11 12	- Site-Specific PQOs - Measurement Performance Criteria Table
2.7 Secondary Data Evaluation	13	- Sources of Secondary Data and Information - Secondary Data Criteria and Limitations Table

Required QAPP Element(s) and Corresponding QAPP Section(s)	QAPP Worksheet # in QAPP Workbook	Required Information
2.8 Project Overview and Schedule 2.8.1 Project Overview 2.8.2 Project Schedule	14 15 16	- Summary of Project Tasks - Reference Limits and Evaluation Table - Project Schedule/Timeline Table
Measurement/Data Acquisition		
3.1 Sampling Tasks 3.1.1 Sampling Process Design and Rationale 3.1.2 Sampling Procedures and Requirements 3.1.2.1 Sampling Collection Procedures 3.1.2.2 Sample Containers, Volume, and Preservation 3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures 3.1.2.4 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures 3.1.2.5 Supply Inspection and Acceptance Procedures 3.1.2.6 Field Documentation Procedures	17 18 19 20 21 22	- Sampling Design and Rationale - Sample Location Map - Sampling Locations and Methods/ SOP Requirements Table - Analytical Methods/SOP Requirements Table - Field Quality Control Sample Summary Table - Sampling SOPs - Project Sampling SOP References Table - Field Equipment Calibration, Maintenance, Testing, and Inspection Table
3.2 Analytical Tasks 3.2.1 Analytical SOPs 3.2.2 Analytical Instrument Calibration Procedures 3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures 3.2.4 Analytical Supply Inspection and Acceptance Procedures	23 24 25	- Analytical SOPs - Analytical SOP References Table - Analytical Instrument Calibration Table - Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	26	- Sample Collection Documentation Handling, Tracking, and Custody SOPs - Sample Container Identification - Sample Handling Flow Diagram - Example Chain-of-Custody Form and Seal

Required QAPP Element(s) and Corresponding QAPP Section(s)	QAPP Worksheet # in QAPP Workbook	Required Information
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	27	- QC Samples Table - Screening/Confirmatory Analysis Decision Tree
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	28 29	- Project Documents and Records Table - Analytical Services Table - Data Management SOPs
Assessment/Oversight		
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	30 31	- Assessments and Response Actions - Planned Project Assessments Table - Audit Checklists - Assessment Findings and Corrective Action Responses Table
4.2 QA Management Reports	32	- QA Management Reports Table
4.3 Final Project Report		
Data Review		
5.1 Overview		
5.2 Data Review Steps 5.2.1 Step I: Verification 5.2.2 Step II: Validation 5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment 5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	33 34 35 36	- Verification (Step I) Process Table - Validation (Steps IIa and IIb) Process Table - Validation (Steps IIa and IIb) Summary Table - Usability Assessment

Required QAPP Element(s) and Corresponding QAPP Section(s)	QAPP Worksheet # in QAPP Workbook	Required Information
5.3 Streamlining Data Review 5.3.1 Data Review Steps To Be Streamlined 5.3.2 Criteria for Streamlining Data Review 5.3.3 Amounts and Types of Data Appropriate for Streamlining		

QAPP Worksheet #3
Distribution List

QAPP Recipients	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control Number
Pete Mannino	RPM	USEPA	212-637-4395		Mannino.pietro@epamail.epa.gov	CDESS-QAPP-01
Ken Maas	KCD PM	USACE	816-983-3709		Kenneth.e.maas@usace.army.mil	CDESS-QAPP-02
Patrick Nejand	COR	USACE	732-846-5830		Patrick.c.nejand@uace.army.mil	CDESS-QAPP-03
Paula Higgins	Chief NYD Safety	USACE				CDESS-QAPP-04
Chris Nastasi	Project Engineer	USACE	732-846-5830		Chris.j.nastasi@usace.army.mil	CDESS-QAPP-05
Ed Dudek	PM	Malcolm Pirnie, Inc.	914-641-2686		edudek@pirnie.com	CDESS-QAPP-06
William Zambrana	CQCSM	Sevenson	908-769-5301	908-769-5303	Zambra973@aol.com	CDESS-QAPP-07
Jennifer Singer	Data Quality Control Review Chemist	Sevenson	716-284-0431	716-285-4201	jsinger@sevenson.com	CDESS-QAPP-08

QAPP Worksheet #4-1
Project Personnel Sign-Off Sheet

Organization: Sevenson

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Kim Lickfield	Project Manager	(908) 769-5301		10-29-08
William Zambrana	Contractor Quality Control Systems Manager	(908) 769-5301		10/29/08
Ken Paisley	Regulatory Specialist	(716) 284-0431		10/29/08
Jennifer Singer	Data Quality Control Review Chemist	(716)284-0431		10/29/08

QAPP Worksheet #4-2
Project Personnel Sign-Off Sheet

Organization: USEPA

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Pete Mannino	Remedial Project Manager	(212) 637-4395		

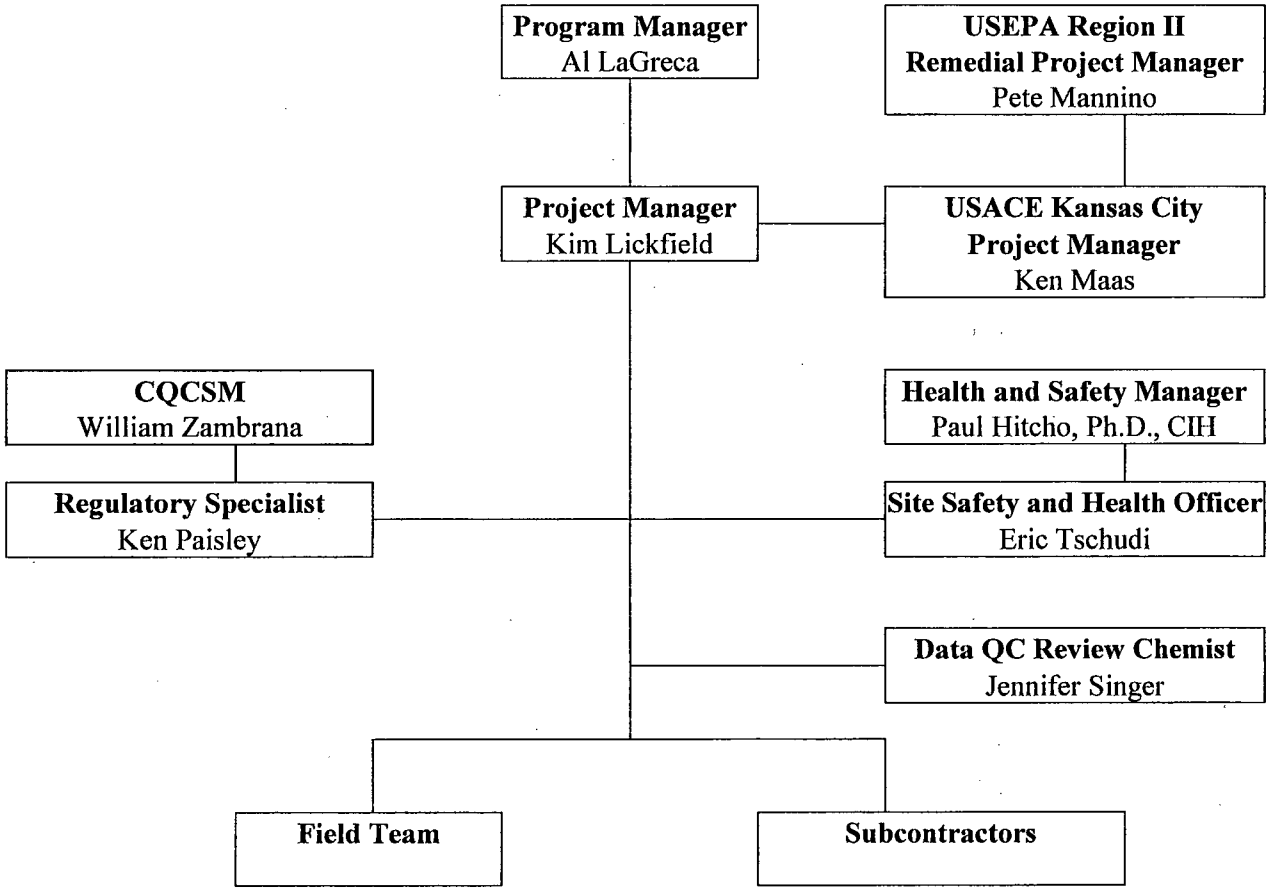
QAPP Worksheet #4-3
Project Personnel Sign-Off Sheet

Organization: USACE

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Ken Maas	Project Manager	(816) 983-3709		
Patrick Nejand	Contracting Officer Representative	(732) 846-5830		
Paula Higgins	Chief NYD Safety			
Chris Nastasi	Project Engineer	(732) 846-5830		

QAPP Worksheet #5
Project Organizational Chart

The organizational chart and the description of project organization and the roles of the team members are summarized below:



Project/Task Organization Overview

The project management team will consist of representatives from USEPA Region II, USACE – Kansas City District, NJDEP, and Sevenson. USEPA and USACE will provide technical oversight to the project and contract management guidance to Sevenson. NJDEP will provide the USEPA with State approval. Sevenson will be the primary contractor and will be responsible for developing and implementing the remedial action and will provide project management to other subcontractors.

Cornell-Dubilier Site Team Members

This section contains a description of the project organizational structure. Pete Mannino is the USEPA Project Manager with responsibility for the site. Ken Maas is the USACE Project Manager. Sevenson will be the primary contractor and will provide project management to other subcontractors.

Sevenson Home Office Personnel

Paul Hitcho, PhD, CIH –Health and Safety Manager. Dr. Hitcho is a Certified Industrial Hygienist (CIH) with over 20 years experience in managing health and safety issues for government and private remedial projects. Dr. Hitcho will be responsible for review and approval of the Site Safety, Health, and Emergency Response Plan (SSHERP). He will also provide Site Safety and Health Officer (SSHO) supervision, present initial site-specific training to all Site personnel, perform the respirator qualitative fit tests, and develop the air-monitoring program. He will conduct quarterly safety audits/inspections.

Al LaGreca – Program Manager. Mr. LaGreca will be ultimately responsible for the project's success. He will make available all Sevenson resources required to complete the project successfully. He will be kept informed of the project's progress and whether or not the contract is meeting its goals. Mr. LaGreca will resolve problems that cannot be resolved by the Project Manager or the Site Superintendent. He will periodically visit the site and become acquainted with field personnel and other representatives. It is anticipated Mr. LaGreca will be on-site once a month.

Kenneth Paisley, CHMM – Regulatory Specialist/Waste Disposal Coordinator. Mr. Paisley is committed to overseeing all field sampling and data acquisition plans, as well as interfacing with offsite laboratory concerns. Mr. Paisley will review laboratory reports with the selected laboratory in order to ensure compliance with project specifications and all required protocols. He will coordinate offsite waste removal, including transport, disposal, manifesting, waste profiles, regulatory compliance, and disposal requirements.

Jennifer Singer – Data Quality Control Review Chemist. The Data Quality Control Review Chemist will support the Contractor Quality Control Systems Manager (CQCSM). Ms. Singer will perform a data review of all analytical data reports received from the laboratory prior to the submission of the data to the USACE and prior to preparation and completion of the chemical data reporting.

Sevenson Field Personnel

Kim Lickfield – Onsite Project Manager. The responsibilities of the Project Manager will include:

- Subcontractor coordination and oversight.
- Acting as liaison between Sevenson, USACE, and USEPA.
- Charge of all field operations.
- Hiring and termination/reassignment of personnel as necessary to support successful task order implementation.
- Management and coordination of all aspects of the project as defined in the Contract Specifications with an emphasis on adhering to the objectives of the remedial activities.
- Assuring corrective actions are taken for deficiencies cited during audits of sampling/analytical activities.
- Project coordination to implement and comply with the Field Sampling Plan (FSP) and QAPP in coordination with the USACE, CQCSM, and Environmental Samplers, including the coordination of field and laboratory schedules pertaining to relevant operation/sampling activities and allocation of resources and staffing to implement the quality assurance (QA) and quality control (QC) program.
- Implementation of the SSHERP, including temporarily suspending field activities if the health and safety of personnel are endangered and/or temporarily suspending an individual for field activities for infractions of the SSHERP, pending further consideration by the Health and Safety Director.
- Review of all documents prepared by project personnel, including all relevant field records and logs.

William Zambrana – Contractor Quality Control Systems Managers. As CQCSM, Mr. Zambrana will report directly to the Project Manager on matters concerning quality control. He will have both the authority and the duty to stop whatever operation appears to be out of compliance with the contract documents. The CQCSM is responsible for field chemistry and environmental sampling staff, and responsibility for all records related to personnel, supplies, equipment use, equipment calibration, and waste transportation and disposal.

Eric Tschudi – Site Health and Safety Officer. As SSHO, Mr. Tschudi will report directly to the Corporate Health and Safety Director and be responsible for the implementation of Sevenson's approved SSHERP, including conducting required safety inspections, safety briefings, and reports of safety-related activities.

QAPP Worksheet #6
Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure
QAPP Amendments	Sevenson	Jennifer Singer	(716) 284-0431	Sevenson Project Manager and CQCSM will initiate changes in the QAPP. Jennifer Singer will be responsible for revisions to the document. USACE and USEPA must approve all changes prior to implementation. Copies of amendments will be forwarded to all parties.
Change to Field Work	Sevenson	Field Team Leader	(908) 769-5301	Field Team Leader will notify Project Manager and CQCSM of any field variations. Project Manager will in turn notify USACE within 24 hours. Telephone and e-mail notifications are acceptable. All field changes will be documented as detailed in Section 5.5 of the FSP.
Analytical Data Reporting	Sevenson	Jennifer Singer	(716) 284-0431	Jennifer Singer will review all analytical data. Any deficiencies will be reported to the Project Manager and laboratory Quality Assurance Officer.
Initiation of Corrective Action	Sevenson	William Zambrana	(908) 769-5301	Sevenson Project Manager and/or Data Quality Control Review Chemist will notify CQCSM of any issues and/or deficiencies who will in turn determine whether the need for corrective action is warranted.
Health and Safety	Sevenson	Eric Tschudi	(908) 769-5301	The SSHO will be responsible for ensuring the protocols specified in the SHERP are carried out during field activities. All safety matters will be reported to the SSHO who will in turn inform the Project Manager. If any issues arise during the field activities that the SSHO cannot address, the Corporate Health and Safety Manager, Dr. Paul Hitcho, will be immediately contacted.
Daily Field Sampling Paperwork	Sevenson	William Zambrana	(908) 769-5301	William Zambrana will e-mail or fax daily field sampling paperwork to the Project Manager and Data Quality Control Review Chemist within 2 business days.
Release of Analytical Data	Sevenson	Jennifer Singer and William Zambrana	(716) 284-0431 (908) 769-5301	No analytical data can be released until Jennifer Singer has completed the data review and William Zambrana has approved the release.

QAPP Worksheet #7
Personnel Responsibilities and Qualifications Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Al LaGreca	Program Manager	Sevenson	Oversees project and responds to USEPA and USACE	B.S. Civil Engineering
Kim Lickfield	Project Manager	Sevenson	Manages project – coordinates between lead agency and subcontractors	A.A.S. Construction Technology
William Zambrana	Contractor Quality Control Systems Manager	Sevenson	QC oversight	A.S. – Radiation Technology
Jennifer Singer	QAPP Preparer and Data Quality Control Review Chemist	Sevenson	Prepares QAPP and performs data review	M.S.- Environmental Pollution Control B.S. - Biochemistry
Eric Tschudi	Health and Safety Officer	Sevenson	Oversees health and safety for field activities	11 years Health and Safety experience
Ken Paisley	Regulatory Specialist/Waste Disposal Coordinator	Sevenson	Coordination of offsite waste removal	B.S. – Biology CHMM certification

QAPP Worksheet #8
Special Personnel Training Requirements Table[1]

Project Function	Specialized Training By Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/Organizational Affiliation	Location of Training Records/Certificates[2]
All Field Activities[3]	40-hour Annual 8-hour refresher	Sevenson	Various and Updated	All field team members	Sevenson staff, subcontractors	Sevenson database and onsite
Sample Collection	Trained in USEPA, USACE, and NJDEP standard sampling methods	Sevenson	Various and Updated	All field team members	Sevenson staff, subcontractors	Resumes
Sample Analysis	Trained in Department of Defense (DOD) Quality Systems Manual and USEPA SW-846 or Contract Laboratory Program (CLP) methods	Project Laboratory	Various and Updated	Project Laboratory	All personnel	Laboratory
Data Review and Assessment	None – review performed by an experienced project chemist	Sevenson	Various	Jennifer Singer	Sevenson Data Quality Control Review Chemist	Sevenson database

[1] Other tasks requiring specialized skills and training will be performed by appropriately qualified subcontractors. Training, certification, and permit requirements will be outlined in separate scopes of work for each task.
[2] If training records and/or certificates are on file elsewhere, document their location in this column. If training records and/or certificates do not exist or are not available, then this should be noted.
[3] All field personnel will be required to be Occupational Safety and Health Administration (OSHA) trained.

QAPP Worksheet #9
Project Scoping Session Participants Sheet

No scoping sessions for OU-2 soil remediation activities have been held. Sessions will be scheduled as needed and worksheet will be updated.

Project Name: Projected Date(s) of Sampling: _____ Project Manager:	Site Name: Site Location:
Date of Session: **Scoping Session Purpose:**	

Name	Title	Affiliation	Phone #	E-mail Address	Project Role

Comments/Decisions:

Action Items:

Consensus Decisions:

QAPP Worksheet #10
Problem Definition

PROBLEM DEFINITION

The site is expected to be restored and redeveloped for commercial/industrial use. However, the site's soils contain contaminants of concern, primarily PCBs, which need to be remediated prior to redevelopment. Elevated concentrations of contaminants of concern in soils may pose a threat through direct contact and as a source of contamination to groundwater.

PROJECT DESCRIPTION

This task addresses the remediation of soils associated with OU-2 of the site. The USEPA signed a ROD for the site in September 2004. The objectives of the current remedial action are:

- Excavation of a pre-determined volume of soil. See Appendix 1 for a map of the approximate limits of contamination.
- Onsite treatment of excavated soil amenable to treatment by LTTD followed by backfilling of excavated areas with treated soils.
- Transportation of soil and debris not suitable for LTTD treatment to an offsite facility for disposal.
- Installation of a multi-layer cap or hardscape.
- Installation of engineering controls.
- Property restoration.
- Institutional controls.

In accordance with the ROD:

- All soil and debris containing total PCBs at concentrations greater than or equal to 500ppm and/or other constituents greater than the NJDEP IGWSCC will be excavated.
- If the excavated soil is treated onsite, the soil must exhibit total PCB concentrations less than 10ppm and other constituents less than the NJDEP IGWSCC prior to reuse onsite.
- Soils with total PCB concentrations between 10ppm and 500ppm will be capped with a multi-layer cap or hardscaped.
- Soils with total PCB concentrations between 2ppm and 5ppm are subject to engineering controls.

Constituents to be sampled include, but are not limited to the following:

- Soil samples will be collected prior to construction of the LTTD treatment pad and following its demolition to verify that no cross-contamination has occurred beneath the area due to operation of the LTTD unit. Samples will also be collected from the surrounding stockpiling/staging locations for the same purpose.
- Soil and debris samples will be collected from materials not suitable for onsite treatment and analyzed in accordance with disposal facility criteria.
- Pre-excavation soil samples will be collected proximate to Pre-Design Investigation (PDI) soil boring SB39 and analyzed for dioxin.
- Pre-excavation soil samples will be collected along the northern site boundary as directed by the USACE Contracting Officer in order to delineate the extent of contamination beyond the property line. Prior to collection of these samples, the USEPA will obtain access agreements.

- Post-excavation confirmatory samples will be collected at the limits of excavation (i.e., bottom and sidewalls) to confirm the final limits of excavation.
- Samples from the daily output of the LTTD unit will be collected and analyzed to determine whether the treated soil is ready to use as fill onsite, whether additional treatment is required prior to backfilling, or whether offsite disposal is warranted. During LTTD system startup, additional sampling of the output will be warranted.
- Offsite fill materials, if required, will be sampled and analyzed to prior to bringing it onsite.
- Water removed from excavations and decontamination activities will be placed in a storage tank and analyzed in accordance with disposal facility criteria.

PROJECT DECISION CONDITIONS

Debris, soil, and water samples will be collected for waste characterization and disposal facility approval. Waste characterization sample results will be compared against the 40CFR261 *Characteristics of Hazardous Waste* and 40CFR761 *PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions* to determine the disposal requirements. Any materials containing Resource Conservation and Recovery Act (RCRA) regulated constituents at concentrations greater than toxicity characteristic leachate procedure (TCLP) criteria will be disposed of as RCRA hazardous waste. Any materials containing concentrations of total PCBs greater than the regulatory standards will be disposed of as Toxic Substance Control Act (TSCA) regulated PCB remediation wastes. Any materials exceeding both criteria will be disposed of as RCRA/TSCA waste.

Post-excavation confirmation sample results will be compared against the NJDEP IGWSCC to confirm that the final limits of excavation have been reached. In addition, post-excavation confirmation samples will be compared against the ROD-specified remedial goal of 5 parts per billion (ppb) for dioxin toxic equivalent (TEQ). If remediation goals are exceeded, additional excavation will be performed, followed by sample collection.

LTTD-treated soil sample results will be compared against the NJDEP IGWSCC and the ROD-specified remedial goal of 5ppb for dioxin TEQ. If the remediation goals are met, the material may be used as onsite fill. If the remediation goals are exceeded, the material may be treated through the LTTD unit again or considered for offsite disposal.

Samples of topsoil and backfill materials from each offsite source will be collected and analyzed to verify that these materials do not contain contaminant levels that are hazardous to human health or the environment. Written approval from USACE will be received prior to bringing backfill or topsoil to the site. NJDEP Residential Direct Contact Soil Cleanup Criteria (RDCSCC) will be used to determine if borrow materials are free from contamination.

QAPP Worksheet #11
Project Quality Objectives/Systematic Planning Process Statements

WHO WILL USE THE DATA?

USEPA Region II, USACE – Kansas City District, and Sevenson will use the data.

WHAT WILL THE DATA BE USED FOR?

- Pre-excavation soil samples will be collected from a limited to number of locations (i.e., proximate to PDI boring SB39, northern property boundary) to further delineate the limits of contamination.
- Pre- and post-remedial action samples will be collected in the vicinity of the LTTD treatment pad and stockpile/staging locations to verify that no cross-contamination has occurred beneath the area due to operation of the LTTD unit.
- Post-excavation soil samples will be collected to verify that known soil contamination is sufficiently bounded and that the contaminated soil has been removed.
- Waste characterization samples will be collected and analyzed to assess suitability for disposal of waste soil, debris, and waste water. Analytical results from these samples will be submitted to the disposal facility to adequately classify waste materials.
- Treated soil samples will be collected to determine whether the soil treated in the onsite LTTD unit has been treated adequately to be used as onsite backfill.
- Backfill materials brought onsite will be sampled and analyzed to verify that the soil is clean for the intended use.

WHAT TYPES OF DATA ARE NEEDED?

The project will contain the following elements:

- Representative sampling locations will be chosen from each sample matrix.
- Standard protocols for sample collection, handling, preparation, and analysis.
- As consistent a sample type among sample locations.

HOW "GOOD" DO DATA NEED TO BE?

Analytical methods are planned to be definitive data quality. Definitive data is defined as data that are suitable for final decision making. They are generated using rigorous analytical methods such as approved USEPA SW-846 reference methods and/or USEPA CLP methods. Definitive data are not restricted in their use unless quality problems require data qualification resulting in unusable data.

WHEN WILL DATA BE COLLECTED?

Data will be collected over the duration of the project.

WHO WILL COLLECT AND GENERATE THE DATA?

The Sevenson sampling team will collect all the samples. The samples will be analyzed for chemical parameters by either a USEPA CLP laboratory, the USEPA Region 2 Division of Environmental Science and Assessment (DESA) laboratory, or a NJDEP certified subcontracted laboratory. An initial request will be made to the DESA laboratory through the FASTAC process, including the completion of the Analytical Services Request (ASR) form, to ascertain the availability to analyze project samples. If CLP

or DESA laboratories are not available, a separate, New Jersey certified laboratory will be subcontracted to analyze and generate analytical data. Analytical data will be managed by Sevenson.

HOW WILL THE DATA BE REPORTED?

The data will be reported by the USEPA assigned CLP laboratory, DESA laboratory, or the subcontracted laboratory to Sevenson. For non-CLP laboratories, full laboratory data reports will be delivered directly to Sevenson for data review. In addition, as required by USEPA Region 2, Sevenson will adhere to the Analytical Services Tracking System (ANSETS) reporting requirement for all work performed by a non-CLP laboratory. For CLP laboratories, third-party validated laboratory results will be received by Sevenson through the USEPA Regional Sample Control Coordinator (RSCC).

HOW WILL THE DATA BE ARCHIVED?

Electronic data will be archived in the project database to be maintained by Sevenson. Hard copies of laboratory reports will also be kept in the Sevenson project files. Data will be transferred to the USACE upon completion of the project. Retrieval of data by others will be at the discretion of the USACE and the USEPA. The length of time that records will be archived will be at the discretion of the USACE and the USEPA.

QAPP Worksheet #12
Measurement Performance Criteria Table

Precision, Accuracy, Representativeness, Completeness, and Comparability

To measure and control the quality of analyses, certain QA parameters are defined and utilized in data analysis activities. These parameters are defined below.

Precision. Precision measures the reproducibility of data or measurements under specific conditions. Precision in a quantitative measure of the variability of a group of data compared to their average value. Duplicate precision is stated in terms of relative percent difference (RPD) of absolute difference between two measurements. Measurement of precision is dependent upon sampling technique and analytical method. Field duplicate and laboratory duplicate samples will be used to measure precision for project samples. Both sampling and analysis will be as consistent as possible. For a pair of measurements, RPD (or absolute difference) will be used, as presented below:

$$RPD = \left(\frac{|X_1 - X_2|}{\frac{(X_1 + X_2)}{2}} \right) \times 100$$

Where: X_1 and X_2 = the two replicate values

RPD will meet the QA requirements listed in the applicable laboratory standard operating procedure.

Accuracy. Accuracy measures the bias in a measurement system. Sources of error include the sampling process, field contamination, preservation, handling, shipping, sample matrix, sample preparation, and analysis technique. Analytical accuracy will be assessed through surrogate spikes, matrix spikes, and laboratory control samples. In general, accuracy is measured in terms of percent recovery:

$$\%R = \frac{|SSR - SR|}{SA} \times 100$$

Where: SSR = measured value of the spiked sample
SR = measured value of the unspiked sample
SA = known amount of the spike in the sample

Representativeness. Representativeness expresses the degree to which data accurately and precisely reflects a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that is dependent upon the proper design and implementation of the sampling program and proper laboratory protocol. The sampling design created for this project was designed to provide data representative of site conditions. During development of the sampling designs, consideration was give to the past history of contamination at the site, existing analytical data, physical setting, and process. Representativeness will be satisfied by determining that the FSP is followed, proper sampling techniques, preservation, and handling are used, proper analytical procedures are followed, and holding times for the samples are not exceeded in the laboratory.

Completeness. Completeness is a measure of the amount of usable data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that the laboratory used for this project will provide data that meet the QC acceptance criteria for 90 percent, or more, of all samples analyzed. Following the completion of the analytical testing, the percent completeness will be calculated using the following equation:

$$\%C = \left(\frac{V}{N}\right) \times 100$$

Where: V = number of measurements judged valid
N = total number of sample results

The data review process will be used to determine the quality and quantity of usable analytical data generated.

The completeness acceptance criterion for samples collected in the field will be 90 percent of the quantity of samples planned for collected in the FSP. Corrective action may be implemented to recollect samples where necessary and possible (e.g., modifying a planned sample location, sample jars broken during shipment). Laboratory notification of sample receipt conditions will be used to determine, as soon as possible, whether any problems during sample shipment would necessitate recollection of samples.

Comparability. Comparability expresses the confidence with which one data set can be compared to another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data are expected to provide comparable data. The procedures used will be USEPA promulgated methods, well recognized and commonly used for environmental investigations.

Desired Method Sensitivity. Depending upon the use to the data and the type of test parameter, specific quantitation limits (QLs) will be required. Worksheet #15 lists the required QLs. In each case, the QLs are well below the project action levels which are also listed or referenced.

QAPP Worksheet #12-1
Measurement Performance Criteria Table

Matrix	Solid and Liquid Waste Characterization
Analytical Group	TCLP Metals
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.4, 4.5	SW846 1331 plus SW846 6010B, 7470A or USEPA CLP ILM05.4	Precision	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	±4°C	Temperature Blank	S
		Representativeness	All target compounds ≤ reporting limit (RL)	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP Scope of Work (SOW) ILM05.4. If a subcontract laboratory analyzes the samples by SW846 methods, the laboratory will be required to achieve their method-specific control limit criteria.

[2] Matrix spike (MS) and matrix spike duplicate (MSD) analyses are required per the analytical method. The analyses may or may not be performed using Site samples; i.e., they may be performed using samples from another laboratory project prepared and analyzed in the same analytical batch. Additional sample volume will not be collected and submitted to the laboratory from the Site for the purpose of MS and MSD analyses.

QAPP Worksheet #12-2
Measurement Performance Criteria Table

Matrix	Solid and Liquid Waste Characterization
Analytical Group	TCLP VOCs
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.4, 4.5	SW846 1311 plus SW846 8260B or USEPA CLP SOM01.2	Precision	Must meet the method-specific control limit criteria	Laboratory Control Sample/Laboratory Control Sample Duplicate	A
		Accuracy	Must meet the method-specific control limit criteria	Matrix Spike[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	Must meet the method-specific control limit criteria	Surrogate Spikes	S&A
		Accuracy	±4°C	Temperature Blank	S
		Representativeness	All target compounds ≤ RL	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2. If a subcontract laboratory analyzes the samples by SW846 methods, the laboratory will be required to achieve their method-specific control limit criteria.

[2] MS analysis is required per the analytical method. The analysis may or may not be performed using a Site sample; i.e., it may be performed using a sample from another laboratory project prepared and analyzed in the same analytical batch. Additional sample volume will not be collected and submitted to the laboratory from the Site for the purpose of MS analysis.

QAPP Worksheet #12-3
Measurement Performance Criteria Table

Matrix	Solid and Liquid Waste Characterization
Analytical Group	TCLP SVOCs
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.4, 4.5	SW846 1311 plus SW846 8270C or USEPA CLP SOM01.2	Precision	Must meet the method-specific control limit criteria	Laboratory Control Sample/Laboratory Control Sample Duplicate	A
		Accuracy	Must meet the method-specific control limit criteria	Matrix Spike[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	Must meet the method-specific control limit criteria	Surrogate Spikes	S&A
		Accuracy	±4°C	Temperature Blank	S
		Representativeness	All target compounds ≤ RL	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2. If a subcontract laboratory analyzes the samples by SW846 methods, the laboratory will be required to achieve their method-specific control limit criteria.

[2] MS analysis is required per the analytical method. The analysis may or may not be performed using a Site sample; i.e., it may be performed using a sample from another laboratory project prepared and analyzed in the same analytical batch. Additional sample volume will not be collected and submitted to the laboratory from the Site for the purpose of MS analysis.

QAPP Worksheet #12-4
Measurement Performance Criteria Table

Matrix	Solid and Liquid Waste Characterization
Analytical Group	TCLP Pesticides
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.4, 4.5	SW846 1311 plus SW846 8081A or USEPA CLP SOM01.2	Precision	Must meet the method-specific control limit criteria	Laboratory Control Sample/Laboratory Control Sample Duplicate	A
		Accuracy	Must meet the method-specific control limit criteria	Matrix Spike[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	Must meet the method-specific control limit criteria	Surrogate Spikes	S&A
		Accuracy	±4°C	Temperature Blank	S
		Representativeness	All target compounds ≤ RL	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2. If a subcontract laboratory analyzes the samples by SW846 methods, the laboratory will be required to achieve their method-specific control limit criteria.

[2] MS analysis is required per the analytical method. The analysis may or may not be performed using a Site sample; i.e., it may be performed using a sample from another laboratory project prepared and analyzed in the same analytical batch. Additional sample volume will not be collected and submitted to the laboratory from the Site for the purpose of MS analysis.

QAPP Worksheet #12-5
Measurement Performance Criteria Table

Matrix	Solid and Liquid Waste Characterization
Analytical Group	TCLP Herbicides
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.4, 4.5	SW846 1311 plus SW846 8151A or USEPA CLP SOM01.2	Precision	Must meet the method-specific control limit criteria	Laboratory Control Sample/Laboratory Control Sample Duplicate	A
		Accuracy	Must meet the method-specific control limit criteria	Matrix Spike[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	Must meet the method-specific control limit criteria	Surrogate Spikes	S&A
		Accuracy	±4°C	Temperature Blank	S
		Representativeness	All target compounds ≤ RL	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2. If a subcontract laboratory analyzes the samples by SW846 methods, the laboratory will be required to achieve their method-specific control limit criteria.

[2] MS analysis is required per the analytical method. The analysis may or may not be performed using a Site sample; i.e., it may be performed using a sample from another laboratory project prepared and analyzed in the same analytical batch. Additional sample volume will not be collected and submitted to the laboratory from the Site for the purpose of MS analysis.

QAPP Worksheet #12-6
Measurement Performance Criteria Table

Matrix	Solid and Liquid Waste Characterization, Soil (post-excavation confirmation, post-treatment, offsite backfill)
Analytical Group	PCBs
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.2 through 4.8	SW846 8082 or USEPA CLP SOM01.2	Precision	RPD≤35%	Field Duplicate	S&A
		Precision	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	Must meet the method-specific control limit criteria	Surrogate Spikes	S&A
		Accuracy	±4°C	Temperature Blank	S
		Representativeness	All target compounds ≤ RL	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2. If a subcontract laboratory analyzes the samples by SW846 methods, the laboratory will be required to achieve their method-specific control limit criteria.

[2] MS and MSD analyses are required per the analytical method. The analyses may or may not be performed using Site samples; i.e., they may be performed using samples from another laboratory project prepared and analyzed in the same analytical batch. Additional sample volume will not be collected and submitted to the laboratory from the Site for the purpose of MS and MSD analyses.

QAPP Worksheet #12-7
Measurement Performance Criteria Table

Matrix	Solid and Liquid Waste Characterization
Analytical Group	Reactivity (Sulfide and Cyanide)
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.4, 4.5	SW846 9012, 9034	Accuracy	Must meet the method-specific control limit criteria	Laboratory Duplicate	A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	±4°C	Temperature Blank	S
		Representativeness	All target compounds ≤ RL	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] The assigned laboratory will be required to achieve their method-specific control limit criteria.
[2] MS and MSD analyses are required per the analytical method. The analyses may or may not be performed using Site samples; i.e., they may be performed using samples from another laboratory project prepared and analyzed in the same analytical batch. Additional sample volume will not be collected and submitted to the laboratory from the Site for the purpose of MS and MSD analyses.

QAPP Worksheet #12-8
Measurement Performance Criteria Table

Matrix	Solid and Liquid Waste Characterization
Analytical Group	Corrosivity
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.4, 4.5	SW846 9045C	Sensitivity	Must agree within ±0.10 pH unit of true value	Initial Calibration Verification	A
		Sensitivity	±0.05 pH unit of the temperature adjusted pH value	Continuing Calibration Verification	A
		Accuracy	±4°C	Temperature Blank	S
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] The assigned laboratory will be required to achieve their method-specific control limit criteria.
[2] MS and MSD analyses are required per the analytical method. The analyses may or may not be performed using Site samples; i.e., they may be performed using samples from another laboratory project prepared and analyzed in the same analytical batch. Additional sample volume will not be collected and submitted to the laboratory from the Site for the purpose of MS and MSD analyses.

QAPP Worksheet #12-9
Measurement Performance Criteria Table

Matrix	Solid and Liquid Waste Characterization
Analytical Group	Ignitability
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.4, 4.5	SW846 1010	Accuracy	Must meet the method-specific control limit criteria	Laboratory Duplicate	A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	±4°C	Temperature Blank	S
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] The assigned laboratory will be required to achieve their method-specific control limit criteria.
[2] MS and MSD analyses are required per the analytical method. The analyses may or may not be performed using Site samples; i.e., they may be performed using samples from another laboratory project prepared and analyzed in the same analytical batch. Additional sample volume will not be collected and submitted to the laboratory from the Site for the purpose of MS and MSD analyses.

QAPP Worksheet #12-10
Measurement Performance Criteria Table

Matrix	Soil (post-excavation confirmation, post-treatment, offsite backfill)
Analytical Group	VOCs
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.2, 4.3, 4.6, 4.7, 4.8	SW846 8260B or USEPA CLP SOM01.2	Precision	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Precision	Must meet the method-specific control limit criteria	Laboratory Control Sample/Laboratory Control Sample Duplicate	A
		Precision	RPD ≤ 40%	Field Duplicate	S&A
		Accuracy	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	Must meet the method-specific control limit criteria	Surrogate Spikes	S&A
		Accuracy	±4°C	Temperature Blank	S
		Representativeness	All target compounds ≤ RL	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2. If a subcontract laboratory analyzes the samples by SW846 methods, the laboratory will be required to achieve their method-specific control limit criteria.

[2] MS and MSD analyses are required per the analytical method. The analyses may or may not be performed using Site samples; i.e., they may be performed using samples from another laboratory project prepared and analyzed in the same analytical batch.

QAPP Worksheet #12-11
Measurement Performance Criteria Table

Matrix	Soil (post-excavation confirmation, post-treatment, offsite backfill)
Analytical Group	SVOCs
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.2, 4.3, 4.6, 4.7, 4.8	SW846 8270C or USEPA CLP SOM01.2	Precision	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Precision	Must meet the method-specific control limit criteria	Laboratory Control Sample/Laboratory Control Sample Duplicate	A
		Precision	RPD ≤ 35%	Field Duplicate	S&A
		Accuracy	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	Must meet the method-specific control limit criteria	Surrogate Spikes	S&A
		Accuracy	±4°C	Temperature Blank	S
		Sensitivity	All target compounds ≤ RL	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2. If a subcontract laboratory analyzes the samples by SW846 methods, the laboratory will be required to achieve their method-specific control limit criteria.

[2] MS and MSD analyses are required per the analytical method. The analyses may or may not be performed using Site samples; i.e., they may be performed using samples from another laboratory project prepared and analyzed in the same analytical batch.

QAPP Worksheet #12-12
Measurement Performance Criteria Table

Matrix	Soil (post-excavation confirmation, post-treatment, offsite backfill)
Analytical Group	Pesticides
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.2, 4.3, 4.6, 4.7, 4.8	SW846 8081A or USEPA CLP SOM01.2	Precision	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Precision	Must meet the method-specific control limit criteria	Laboratory Control Sample/Laboratory Control Sample Duplicate	A
		Precision	RPD ≤ 35%	Field Duplicate	S&A
		Accuracy	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	Must meet the method-specific control limit criteria	Surrogate Spikes	S&A
		Accuracy	±4°C	Temperature Blank	S
		Representativeness	All target compounds ≤ RL	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2. If a subcontract laboratory analyzes the samples by SW846 methods, the laboratory will be required to achieve their method-specific control limit criteria.

[2] MS and MSD analyses are required per the analytical method. The analyses may or may not be performed using Site samples; i.e., they may be performed using samples from another laboratory project prepared and analyzed in the same analytical batch.

QAPP Worksheet #12-13
Measurement Performance Criteria Table

Matrix	Soil (post-excavation confirmation, post-treatment, offsite backfill)
Analytical Group	Metals and Cyanide
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.2, 4.3, 4.6, 4.7, 4.8	SW846 6010B, 7471A, 9014 or USEPA CLP ILM05.4	Precision	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Precision	RPD ≤ 40%	Field Duplicate	S&A
		Accuracy	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	±4°C	Temperature Blank	S
		Representativeness	All target compounds ≤ RL	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW ILM05.4. If a subcontract laboratory analyzes the samples by SW846 methods, the laboratory will be required to achieve their method-specific control limit criteria.

[2] MS and MSD analyses are required per the analytical method. The analyses may or may not be performed using Site samples; i.e., they may be performed using samples from another laboratory project prepared and analyzed in the same analytical batch.

QAPP Worksheet #12-14
Measurement Performance Criteria Table

Matrix	Soil (post-excavation confirmation, post-treatment)
Analytical Group	Dioxins/Furans
Concentration Level	Unknown

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria[1]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FSP Sections 4.1, 4.2, 4.3, 4.6, 4.7, 4.8	SW846 8290 or USEPA CLP DLM02.0	Precision	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Precision	Must meet the method-specific control limit criteria	Laboratory Control Sample/Laboratory Control Sample Duplicate	A
		Precision	RPD ≤ 35%	Field Duplicate	S&A
		Accuracy	Must meet the method-specific control limit criteria	Matrix Spike/Matrix Spike Duplicate[2]	S&A
		Accuracy	Must meet the method-specific control limit criteria	Laboratory Control Sample	A
		Accuracy	Must meet the method-specific control limit criteria	Extraction Standards	S&A
		Accuracy	±4°C	Temperature Blank	S
		Representativeness	All target compounds ≤ RL	Method Blank	A
		Completeness	≥95%	Data Assessment	S&A
		Comparability	Similar units and methods	Data results review	S&A

[1] If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW DLM02.0. If a subcontract laboratory analyzes the samples by SW846 methods, the laboratory will be required to achieve their method-specific control limit criteria.

[2] MS and MSD analyses are required per the analytical method. The analyses may or may not be performed using Site samples; i.e., they may be performed using samples from another laboratory project prepared and analyzed in the same analytical batch.

QAPP Worksheet #13
Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Organization, Data Types, Data Generation/Collection Dates)	How Data Will Be Used	Limitations on Data Use
Specifications and Drawings, 100% Remedial Design	Malcolm Pirnie, Inc., 2008	Malcolm Pirnie, Inc.	Historical data that will define the limits of the initial soil excavations	None for the current intended project objectives

QAPP Worksheet #14
Summary of Project Tasks

Sampling Tasks: Samples will be collected for analytical parameters from the locations described in Worksheets #17 and #18 per the instructions in the Field Sampling Plan, Section 4.

Analysis Tasks: Analytical methodologies are described in Worksheets #19 and #23.

Quality Control Tasks: The analytical laboratories will be required to analyze QC samples listed in the USEPA CLP Scope of Work (SOW) and the other documents and procedures give in Worksheet #28. Laboratory analytical data will undergo internal reviews and validation.

Secondary Data: Reports and analytical data associated with prior investigations are defined in Worksheet #13.

Data Management Tasks: Both hard copy and electronic data deliverables will be tracked, stored, handled, and managed. All data, field notes, and analytical information will be placed in an electronic database which will be maintained in the Sevenson corporate office. All electronic data will be backed up. Hardcopies of data will be stored in project files.

Documentation and Records: All hardcopy data (e.g., field notebooks, photos, hard copies of chain of custody forms, airbills, etc.) will be taken to the Sevenson corporate office and kept in the project files.

Assessment/Audit Tasks: Audits of field staff compliance with project SOPs will be performed on a periodic basis as determined by the Project CQCSM or the field team leader. Audits of laboratory compliance with standard operating procedures (SOPs) will be performed on a periodic basis as determined by the laboratory QA manager. In addition, laboratory data will be audited as part of the data validation process as defined in this QAPP. The laboratory may be audited onsite by Sevenson at any time based on need determined by the Sevenson project chemist.

Subcontracted laboratories will maintain current requirements for certification required by NJDEP and also carry current certification form the National Environmental Laboratory Accreditation Program (NELAP). The subcontracted laboratory will also complete all required self-declaration documentation to the satisfaction of the USACE Kansas City District.

Data Review Tasks: If laboratory data is produced by DESA and/or CLP laboratories, then the reported results will be considered validated. Any non-CLP chemical data that is generated will be reviewed by Sevenson against the criteria in the applicable analytical SOP. See also Worksheets #23, #28, #35, and #36.

Data review by Sevenson will include, but may not be limited to, the following parameters:

- Data completeness
- Holding time
- Laboratory control samples
- Method blanks
- Surrogate spikes
- Matrix spike and matrix spike duplicates
- Laboratory and field duplicates

A Quality Control Summary Report (QCSR) will be provided at the end of each quarter to summarize the results of the data review findings and to present conclusions regarding the usability of the data for project objectives. The report will assess the accuracy, precision, representativeness, comparability, and completeness of the data generated. The report will focus on out of control data results and present a table of non-compliant results that exceeded some QC requirement.

QAPP Worksheet #15-1
Reference Limits and Evaluation Table

Matrix: Solid and Liquid Waste Characterization
Analytical Group: TCLP Metals
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (mg/L)[1]	Project Quantitation Limit Goal (mg/L)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (mg/L)	Method QLs (mg/L)	MDLs (mg/L)	QLs (mg/L)
Arsenic	7440-38-2	5.00	0.5	NA	0.010	NA	0.010
Barium	7440-39-3	100.00	10	NA	0.200	NA	0.200
Cadmium	7440-43-9	1.00	0.1	NA	0.005	NA	0.005
Chromium	7440-47-3	5.00	0.5	NA	0.010	NA	0.010
Lead	7439-92-1	5.00	0.5	NA	0.010	NA	0.010
Mercury	7439-97-6	0.20	0.02	NA	0.0002	NA	0.0002
Selenium	7782-49-2	1.00	0.1	NA	0.035	NA	0.035
Silver	7440-22-4	5.00	0.5	NA	0.010	NA	0.010

[1] Project action limits are based upon RCRA. This information will be used for disposal.
[2] The project quantiation limits are based upon one-tenth of the RCRA limits
[3] The method QLs listed are the USEPA CLP ILM05.4 contract required quantitation limits for aqueous samples.
[4] The achievable laboratory limits listed at the USEPA CLP ILM05.4 contract required quantitation limits for aqueous samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-2
Reference Limits and Evaluation Table

Matrix: Solid and Liquid Waste Characterization
Analytical Group: TCLP VOCs
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/L)[1]	Project Quantitation Limit Goal (µg/L)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/L)	Method QLs (µg/L)	MDLs (µg/L)	QLs (µg/L)
Benzene	71-43-2	500	50	NA	5.0	NA	5.0
2-Butanone	78-93-3	200,000	20,000	NA	10	NA	10
Carbon Tetrachloride	56-23-5	500	50	NA	5.0	NA	5.0
Chlorobenzene	108-90-7	100,000	10,000	NA	5.0	NA	5.0
Chloroform	67-66-3	6,000	600	NA	5.0	NA	5.0
1,2-Dichloroethane	107-06-2	500	50	NA	5.0	NA	5.0
1,1-Dichloroethene	75-35-4	700	70	NA	5.0	NA	5.0
Tetrachloroethene	127-18-4	700	70	NA	5.0	NA	5.0
Trichloroethene	79-01-6	500	50	NA	5.0	NA	5.0
Vinyl Chloride	75-01-4	200	20	NA	5.0	NA	5.0

[1] Project action limits are based upon RCRA. This information will be used for disposal.
[2] The project quantiation limits are based upon one-tenth of the RCRA limits
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for low concentration aqueous samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for low concentration aqueous samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-3
Reference Limits and Evaluation Table

Matrix: Solid and Liquid Waste Characterization
Analytical Group: TCLP SVOCs
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/L)[1]	Project Quantitation Limit Goal (µg/L)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/L)	Method QLs (µg/L)	MDLs (µg/L)	QLs (µg/L)
Cresols (o, m, and p)	106-44-5 (m) 95-48-7 (o) 106-44-5 (p)	200,000	20,000	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	7,500	750	NA	5.0	NA	5.0
2,4-Dinitrotoluene	121-14-2	130	13	NA	5.0	NA	5.0
Hexachlorobenzene	118-74-1	130	13	NA	5.0	NA	5.0
Hexachlorobutadiene	87-68-3	500	50	NA	5.0	NA	5.0
Hexachloroethane	67-72-1	3,000	300	NA	5.0	NA	5.0
Nitrobenzene	98-95-3	2,000	200	NA	5.0	NA	5.0
Pentachlorophenol	87-86-5	100,000	10,000	NA	10	NA	10
Pyridine	110-86-1	5,000	500	NA	NA	NA	NA
2,4,5-Trichlorophenol	95-95-4	400,000	40,000	NA	5.0	NA	5.0
2,4,6-Trichlorophenol	88-06-2	2,000	200	NA	5.0	NA	5.0

[1] Project action limits are based upon RCRA. This information will be used for disposal.
[2] The project quantiation limits are based upon one-tenth of the RCRA limits
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for low concentration aqueous samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for low concentration aqueous samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-4
Reference Limits and Evaluation Table

Matrix: Solid and Liquid Waste Characterization
Analytical Group: TCLP Pesticides
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/L)[1]	Project Quantitation Limit Goal (µg/L)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/L)	Method QLs (µg/L)	MDLs (µg/L)	QLs (µg/L)
Chlordane	57-74-9	30	3	NA	0.050	NA	0.050
Endrin	72-20-8	20	2	NA	0.10	NA	0.10
Heptachlor	76-44-8	8	0.8	NA	0.050	NA	0.050
Lindane (gamma-BHC)	58-89-9	400	40	NA	0.050	NA	0.050
Methoxychlor	72-43-5	10,000	1,000	NA	0.50	NA	0.50
Toxaphene	8001-35-2	500	50	NA	5.0	NA	5.0

[1] Project action limits are based upon RCRA. This information will be used for disposal.
[2] The project quantiation limits are based upon one-tenth of the RCRA limits
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for aqueous samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for aqueous samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-5
Reference Limits and Evaluation Table

Matrix: Solid (e.g., concrete, debris) and Aqueous
Analytical Group: TCLP Herbicides
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/L)[1]	Project Quantitation Limit Goal (µg/L)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/L)	Method QLs (µg/L)	MDLs (µg/L)	QLs (µg/L)
2,4-D	94-75-7	10,000	1,000	NA	NA	NA	NA
2,4,5-TP	93-72-1	1,000	100	NA	NA	NA	NA

[1] Project action limits are based upon RCRA. This information will be used for disposal.
[2] The project quantiation limits are based upon one-tenth of the RCRA limits
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for aqueous samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for aqueous samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-6
Reference Limits and Evaluation Table

Matrix: Solid Waste Characterization
Analytical Group: PCBs
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (mg/Kg)[1]	Project Quantitation Limit Goal (mg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (mg/Kg)	Method QLs (mg/Kg)[3]	MDLs (mg/Kg)	QLs (mg/Kg)
Aroclor 1016	12674-11-2	50	5	NA	0.033	NA	0.033
Aroclor 1221	11104-28-2			NA	0.033	NA	0.033
Aroclor 1232	11141-16-5			NA	0.033	NA	0.033
Aroclor 1242	53469-1-9			NA	0.033	NA	0.033
Aroclor 1248	12672-29-6			NA	0.033	NA	0.033
Aroclor 1254	11097-69-1			NA	0.033	NA	0.033
Aroclor 1260	11096-82-5			NA	0.033	NA	0.033

[1] Project action limits are based upon RCRA. This information will be used for disposal.
[2] The project quantiation limits are based upon one-tenth of the RCRA limits
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for soil samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-7
Reference Limits and Evaluation Table

Matrix: Liquid Waste Characterization
Analytical Group: PCBs
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (mg/L)[1]	Project Quantitation Limit Goal (mg/L)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (mg/L)	Method QLs (mg/L)[3]	MDLs (mg/L)	QLs (mg/L)
Aroclor 1016	12674-11-2	50	5	NA	0.001	NA	0.001
Aroclor 1221	11104-28-2			NA	0.001	NA	0.001
Aroclor 1232	11141-16-5			NA	0.001	NA	0.001
Aroclor 1242	53469-1-9			NA	0.001	NA	0.001
Aroclor 1248	12672-29-6			NA	0.001	NA	0.001
Aroclor 1254	11097-69-1			NA	0.001	NA	0.001
Aroclor 1260	11096-82-5			NA	0.001	NA	0.001

[1] Project action limits are based upon RCRA. This information will be used for disposal.
[2] The project quantiation limits are based upon one-tenth of the RCRA limits
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for aqueous samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for aqueous samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-8
Reference Limits and Evaluation Table

Matrix: Offsite Backfill and Topsoil
Analytical Group: VOCs
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)	MDLs (µg/Kg)	QLs (µg/Kg)
Dichlorodifluoromethane	75-71-8	NS	-	NA	5.0	NA	5.0
Chloromethane	74-87-3	520,000	52,000	NA	5.0	NA	5.0
Vinyl Chloride	75-01-4	2,000	200	NA	5.0	NA	5.0
Bromomethane	74-83-9	79,000	7,900	NA	5.0	NA	5.0
Chloroethane	75-00-3	NS	-	NA	5.0	NA	5.0
Trichlorofluoromethane	75-69-4	NS	-	NA	5.0	NA	5.0
1,1-Dichloroethene	75-35-4	8,000	800	NA	5.0	NA	5.0
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NS	-	NA	5.0	NA	5.0
Acetone	67-64-1	1,000,000	100,000	NA	10	NA	10
Carbon Disulfide	75-15-0	NS	-	NA	5.0	NA	5.0
Methyl Acetate	79-20-9	NS	-	NA	5.0	NA	5.0
Methylene Chloride	75-09-2	49,000	4,900	NA	5.0	NA	5.0
trans-1,2-Dichloroethene	156-60-5	1,000,000	100,000	NA	5.0	NA	5.0
Methyl tert-butyl ether	1634-04-4	NS	-	NA	5.0	NA	5.0
1,1-Dichloroethane	75-34-3	570,000	57,000	NA	5.0	NA	5.0
cis-1,2-Dichloroethene	156-59-2	79,000	7,900	NA	5.0	NA	5.0
2-Butanone	78-93-3	1,000,000	100,000	NA	10	NA	10
Bromochloromethane	74-97-5	NS	-	NA	5.0	NA	5.0
Chloroform	67-66-3	19,000	1,900	NA	5.0	NA	5.0
1,1,1-Trichloroethane	71-55-6	210,000	21,000	NA	5.0	NA	5.0
Cycohexane	110-82-7	NS	-	NA	5.0	NA	5.0
Carbon Tetrachloride	56-23-5	2,000	200	NA	5.0	NA	5.0
Benzene	71-43-2	3,000	300	NA	5.0	NA	5.0
1,2-Dichloroethane	107-06-2	6,000	600	NA	5.0	NA	5.0
1,4-Dioxane	123-91-1	NS	-	NA	100	NA	100
Trichloroethene	79-01-6	23,000	2,300	NA	5.0	NA	5.0

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)	MDLs (µg/Kg)	QLs (µg/Kg)
Methylcyclohexane	108-87-2	NS	-	NA	5.0	NA	5.0
1,2-dichloropropane	78-87-5	10,000	1,000	NA	5.0	NA	5.0
Bromodichloromethane	75-27-4	11,000	1,100	NA	5.0	NA	5.0
1,3-dichloropropene (cis and trans)	10061-01-5 (cis) 10061-02-6 (trans)	4,000	400	NA	5.0	NA	5.0
4-Methyl-2-Pentanone	108-10-1	1,000,000	100,000	NA	10	NA	10
Toluene	108-88-3	1,000,000	100,000	NA	5.0	NA	5.0
1,1,2-Trichloroethane	79-00-5	22,000	2,200	NA	5.0	NA	5.0
Tetrachloroethene	127-18-4	4,000	400	NA	5.0	NA	5.0
2-Hexanone	591-78-6	NS	-	NA	10	NA	10
Dibromochloromethane	124-48-1	110,000	11,000	NA	5.0	NA	5.0
1,2-Dibromoethane	106-93-4	NS	-	NA	5.0	NA	5.0
Chlorobenzene	108-90-7	37,000	3,700	NA	5.0	NA	5.0
Ethylbenzene	100-41-4	1,000,000	100,000	NA	5.0	NA	5.0
Xylenes (total)	1330-20-7	410,000	41,000	NA	5.0	NA	5.0
Styrene	100-42-5	23,000	2,300	NA	5.0	NA	5.0
Bromoform	75-25-2	86,000	8,600	NA	5.0	NA	5.0
Isopropylbenzene	98-82-8	NS	-	NA	5.0	NA	5.0
1,1,2,2-Tetrachloroethane	79-34-5	34,000	3,400	NA	5.0	NA	5.0
1,3-Dichlorobenzene	541-73-1	5,100,000	510,000	NA	5.0	NA	5.0
1,4-Dichlorobenzene	106-46-7	570,000	57,000	NA	5.0	NA	5.0
1,2-Dichlorobenzene	95-50-1	5,100,000	510,000	NA	5.0	NA	5.0
1,2-Dibromo-3-chloropropane	96-12-8	NS	-	NA	5.0	NA	5.0
1,2,4-Trichlorobenzene	120-82-1	68,000	6,800	NA	5.0	NA	5.0
1,2,3-Trichlorobenzene	87-67-6	NS	-	NA	5.0	NA	5.0

[1] Project action limits are based upon NJDEP RDCSCC. "NS" indicates that there is no criteria listed for the analyte.
[2] The project quantiation limits are based upon one-tenth of the RDCSCC.
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for low concentration soil samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for low concentration soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-9
Reference Limits and Evaluation Table

Matrix: Offsite Backfill and Topsoil
Analytical Group: SVOCs
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)[3]	MDLs (µg/Kg)	QLs (µg/Kg)
Benzaldehyde	100-52-7	NS	-	NA	170	NA	170
Phenol	108-95-2	10,000,000	1,000,000	NA	170	NA	170
Bis(2-chloroethyl)ether	111-44-4	660	66	NA	170	NA	170
2-Chlorophenol	95-57-8	280,000	28,000	NA	170	NA	170
2-Methylphenol	95-48-7	2,800,000	280,000	NA	170	NA	170
Bis(2-chloroisoproyl)ether	108-60-1	2,300,000	230,000	NA	170	NA	170
Acetophenone	98-86-2	NS	-	NA	170	NA	170
4-Methylphenol	106-44-5	2,800,000	280,000	NA	170	NA	170
N-Nitroso-di-n-propylamine	621-64-7	660	66	NA	170	NA	170
Hexachloroethane	67-72-1	6,000	600	NA	170	NA	170
Nitrobenzene	98-95-3	28,000	2,800	NA	170	NA	170
Isophorone	78-59-1	1,100,000	110,000	NA	170	NA	170
2-Nitrophenol	88-75-5	NS	-	NA	170	NA	170
2,4-Dimethylphenol	105-67-9	1,100,000	110,000	NA	170	NA	170
Bis(2-chloroethoxy)methane	111-91-1	NS	-	NA	170	NA	170
2,4-Dichlorophenol	120-83-2	170,000	17,000	NA	170	NA	170
Naphthalene	91-20-3	230,000	23,000	NA	170	NA	170
4-Chloroaniline	106-47-8	230,000	23,000	NA	170	NA	170
Hexachlorobutadiene	87-68-3	1,000	100	NA	170	NA	170
Caprolactam	105-60-2	NS	-	NA	170	NA	170
4-Chloro-3-methylphenol	59-50-7	10,000,000	1,000,000	NA	170	NA	170
2-Methylnaphthalene	91-57-6	NS	-	NA	170	NA	170
Hexachlorocyclopentadiene	77-47-4	400,000	40,000	NA	170	NA	170
2,4,6-Trichlorophenol	88-06-2	62,000	6,200	NA	170	NA	170
2,4,5-Trichlorophenol	95-95-4	5,600,000	560,000	NA	170	NA	170
1,1'-Biphenyl	92-52-4	NS	-	NA	170	NA	170
2-Chloronaphthalene	91-58-7	NS	-	NA	170	NA	170

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)[3]	MDLs (µg/Kg)	QLs (µg/Kg)
2-Nitroaniline	88-74-4	NS	-	NA	330	NA	330
Dimethyl phthalate	131-11-3	10,000,000	1,000,000	NA	170	NA	170
Dinitrotoluene (2,4-/2,6-mixture)	121-14-2 (2,4-) 606-20-2 (2,6-)	1,000	100	NA	170	NA	170
Acenaphthylene	208-96-8	NS	-	NA	170	NA	170
3-Nitroaniline	99-09-2	NS	-	NA	330	NA	330
Acenaphthene	83-32-9	3,400,000	340,000	NA	170	NA	170
2,4-Dinitrophenol	51-28-5	110,000	11,000	NA	330	NA	330
4-Nitrophenol	100-02-7	NS	-	NA	330	NA	330
Dibenzofuran	132-64-9	NS	-	NA	170	NA	170
Diethyl phthalate	84-66-2	10,000,000	1,000,000	NA	170	NA	170
Fluorene	86-73-7	2,300,000	230,000	NA	170	NA	170
4-Chlorophenyl-phenyl-ether	7005-72-3	NS	-	NA	170	NA	170
4-Nitroaniline	100-01-6	NS	-	NA	330	NA	330
4,6-Dinitro-2-methylphenol	534-52-1	NS	-	NA	330	NA	330
N-Nitrosodiphenylamine	86-30-6	140,000	14,000	NA	170	NA	170
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	-	NA	170	NA	170
4-Bromophenyl-phenyl-ether	101-55-3	NS	-	NA	170	NA	170
Hexachlorobenzene	118-74-1	660	66	NA	170	NA	170
Atrazine	1912-24-9	NS	-	NA	170	NA	170
Pentachlorophenol	87-86-5	6,000	600	NA	330	NA	330
Phenanthrene	85-01-8	NS	-	NA	170	NA	170
Anthracene	120-12-7	10,000,000	1,000,000	NA	170	NA	170
Carbazole	86-74-8	NS	-	NA	170	NA	170
di-n-Butyl phthalate	84-74-2	5,700,000	570,000	NA	170	NA	170
Fluoranthene	206-44-0	2,300,000	230,000	NA	170	NA	170
Pyrene	129-00-0	1,700,000	170,000	NA	170	NA	170
Butyl benzyl phthalate	85-68-7	1,100,000	110,000	NA	170	NA	170
3,3'-Dichlorobenzidine	91-94-1	2,000	200	NA	170	NA	170
Benzo(a)anthracene	56-55-3	900	90	NA	170	NA	170
Chrysene	218-01-9	9,000	900	NA	170	NA	170
Bis(2-ethylhexyl)phthalate	117-81-7	49,000	4,900	NA	170	NA	170
di-n-Octylphthalate	117-84-0	1,100,000	110,000	NA	170	NA	170

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)[3]	MDLs (µg/Kg)	QLs (µg/Kg)
Benzo(b)fluoranthene	205-99-2	900	90	NA	170	NA	170
Benzo(k)fluoranthene	207-08-9	900	90	NA	170	NA	170
Benzo(a)pyrene	50-32-8	660	66	NA	170	NA	170
Indeno(1,2,3-cd)pyrene	193-39-5	900	90	NA	170	NA	170
Dibenzo(a,h)anthracene	53-70-3	660	66	NA	170	NA	170
Benzo(g,h,i)perylene	191-24-2	NS	-	NA	170	NA	170
2,3,4,6-Tetrachlorophenol	58-90-2	NS	-	NA	170	NA	170

[1] Project action limits are based upon NJDEP RDCSCC. "NS" indicates that there is no criteria listed for the analyte.
[2] The project quantiation limits are based upon one-tenth of the RDCSCC.
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for low concentration soil samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for low concentration soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-10
Reference Limits and Evaluation Table

Matrix: Offsite Backfill and Topsoil
Analytical Group: Pesticides
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)	MDLs (µg/Kg)	QLs (µg/Kg)
Alpha-BHC	319-84-6	NS	-	NA	1.7	NA	1.7
Beta-BHC	319-85-7	NS	-	NA	1.7	NA	1.7
Delta-BHC	319-86-8	NS	-	NA	1.7	NA	1.7
Gamma-BHC	58-89-9	520	52	NA	1.7	NA	1.7
Heptachlor	76-44-8	150	15	NA	1.7	NA	1.7
Aldrin	309-00-2	40	4	NA	1.7	NA	1.7
Heptachlor epoxide	1024-57-3	NS	-	NA	1.7	NA	1.7
Endosulfan I	959-98-8	340,000	34,000	NA	1.7	NA	1.7
Dieldrin	60-57-1	42	4.2	NA	3.3	NA	3.3
4,4'-DDE	72-55-9	2,000	200	NA	3.3	NA	3.3
Endrin	72-20-8	17,000	1,700	NA	3.3	NA	3.3
Endosulfan II	33213-65-9	NS	-	NA	3.3	NA	3.3
4,4'-DDD	72-54-8	3,000	300	NA	3.3	NA	3.3
Endosulfan sulfate	1031-07-8	NS	-	NA	3.3	NA	3.3
4,4'-DDT	50-29-3	2,000	200	NA	3.3	NA	3.3
Methoxychlor	72-43-5	280,000	28,000	NA	17.0	NA	17.0
Endrin ketone	53494-70-5	NS	-	NA	3.3	NA	3.3
Endrin aldehyde	7421-93-4	NS	-	NA	3.3	NA	3.3
Alpha-chlordane	5103-71-9	NS	-	NA	1.7	NA	1.7
Gamma-chlordane	5103-74-2	NS	-	NA	1.7	NA	1.7
Toxaphene	8001-35-2	100	10	NA	170.0	NA	170.0

[1] Project action limits are based upon NJDEP RDCSCC. "NS" indicates that there is no criteria listed for the analyte.
[2] The project quantiation limits are based upon one-tenth of the RDCSCC.
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for soil samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-11
Reference Limits and Evaluation Table

Matrix: Offsite Backfill and Topsoil
Analytical Group: PCBs
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)[3]	MDLs (µg/Kg)	QLs (µg/Kg)
Aroclor 1016	12674-11-2	490	49	NA	33.0	NA	33.0
Aroclor 1221	11104-28-2			NA	33.0	NA	33.0
Aroclor 1232	11141-16-5			NA	33.0	NA	33.0
Aroclor 1242	53469-21-9			NA	33.0	NA	33.0
Aroclor 1248	12672-29-6			NA	33.0	NA	33.0
Aroclor 1254	11097-69-1			NA	33.0	NA	33.0
Aroclor 1260	11096-82-5			NA	33.0	NA	33.0

[1] Project action limits are based upon NJDEP RDCSCC. "NS" indicates that there is no criteria listed for the analyte.
[2] The project quantiation limits are based upon one-tenth of the RDCSCC.
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for soil samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-12
Reference Limits and Evaluation Table

Matrix: Offsite Backfill and Topsoil
Analytical Group: Metals
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (mg/Kg)[1]	Project Quantitation Limit Goal (mg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (mg/Kg)	Method QLs (mg/Kg)	MDLs (mg/Kg)	QLs (mg/Kg)
Aluminum	7429-90-5	NS	-	NA	20	NA	20
Antimony	7440-36-0	14	1.4	NA	6	NA	6
Arsenic	7440-38-2	20	2.0	NA	1	NA	1
Barium	7440-39-3	700	70	NA	20	NA	20
Beryllium	7440-41-7	2	0.2	NA	0.5	NA	0.5
Cadmium	7440-43-9	39	3.9	NA	0.5	NA	0.5
Calcium	7440-70-2	NS	-	NA	500	NA	500
Chromium	7440-47-3	120,000	12,000	NA	1	NA	1
Cobalt	7440-48-4	NS	-	NA	5	NA	5
Copper	7440-50-8	600	60	NA	2.5	NA	2.5
Cyanide	57-12-5	1,100	110	NA	2.5	NA	2.5
Iron	7439-89-6	NS	-	NA	10	NA	10
Lead	7439-92-1	400	40	NA	1	NA	1
Magnesium	7439-95-4	NS	-	NA	500	NA	500
Manganese	7439-96-5	NS	-	NA	1.5	NA	1.5
Mercury	7439-97-6	14	1.4	NA	0.1	NA	0.1
Nickel	7440-02-0	250	25	NA	4	NA	4
Potassium	7440-09-7	NS	-	NA	500	NA	500
Selenium	7782-49-2	63	6.3	NA	3.5	NA	3.5
Silver	7440-22-4	110	11	NA	1	NA	1
Sodium	7440-23-5	NS	-	NA	500	NA	500
Thallium	7440-28-0	2	0.2	NA	2.5	NA	2.5
Vanadium	7440-62-2	370	37	NA	5	NA	5
Zinc	7440-66-6	1,500	150	NA	6	NA	6

[1] Project action limits are based upon NJDEP RDCSCC. "NS" indicates that there is no criteria listed for the analyte.
[2] The project quantiation limits are based upon one-tenth of the RDCSCC.
[3] The method QLs listed are the USEPA CLP ILM05.4 contract required quantitation limits for soil samples.

[4] The achievable laboratory limits listed at the USEPA CLP ILM05.4 contract required quantitation limits for soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-13
Reference Limits and Evaluation Table

Matrix: Pre-Excavation Soil, Post-Excavation Soil, Post-Treatment Soil
Analytical Group: VOCs
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)	MDLs (µg/Kg)	QLs (µg/Kg)
Dichlorodifluoromethane	75-71-8	NS	-	NA	5.0	NA	5.0
Chloromethane	74-87-3	10,000	1,000	NA	5.0	NA	5.0
Vinyl Chloride	75-01-4	10,000	1,000	NA	5.0	NA	5.0
Bromomethane	74-83-9	1,000	100	NA	5.0	NA	5.0
Chloroethane	75-00-3	NS	-	NA	5.0	NA	5.0
Trichlorofluoromethane	75-69-4	NS	-	NA	5.0	NA	5.0
1,1-Dichloroethene	75-35-4	10,000	1,000	NA	5.0	NA	5.0
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NS	-	NA	5.0	NA	5.0
Acetone	67-64-1	100,000	10,000	NA	10	NA	10
Carbon Disulfide	75-15-0	NS	-	NA	5.0	NA	5.0
Methyl Acetate	79-20-9	NS	-	NA	5.0	NA	5.0
Methylene Chloride	75-09-2	1,000	100	NA	5.0	NA	5.0
trans-1,2-Dichloroethene	156-60-5	50,000	5,000	NA	5.0	NA	5.0
Methyl tert-butyl ether	1634-04-4	NS	-	NA	5.0	NA	5.0
1,1-Dichloroethane	75-34-3	10,000	1,000	NA	5.0	NA	5.0
cis-1,2-Dichloroethene	156-59-2	1,000	100	NA	5.0	NA	5.0
2-Butanone	78-93-3	50,000	5,000	NA	10	NA	10
Bromochloromethane	74-97-5	NS	-	NA	5.0	NA	5.0
Chloroform	67-66-3	1,000	100	NA	5.0	NA	5.0
1,1,1-Trichloroethane	71-55-6	50,000	5,000	NA	5.0	NA	5.0
Cycohexane	110-82-7	NS	-	NA	5.0	NA	5.0
Carbon Tetrachloride	56-23-5	1,000	100	NA	5.0	NA	5.0
Benzene	71-43-2	1,000	100	NA	5.0	NA	5.0
1,2-Dichloroethane	107-06-2	1,000	100	NA	5.0	NA	5.0
1,4-Dioxane	123-91-1	NS	-	NA	100	NA	100
Trichloroethene	79-01-6	1,000	100	NA	5.0	NA	5.0

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)	MDLs (µg/Kg)	QLs (µg/Kg)
Methylcyclohexane	108-87-2	NS	-	NA	5.0	NA	5.0
1,2-Dichloropropane	78-87-5	NS	-	NA	5.0	NA	5.0
Bromodichloromethane	75-27-4	1,000	100	NA	5.0	NA	5.0
1,3-dichloropropene (cis and trans)	10061-01-5 (cis) 10061-02-6 (trans)	1,000	100	NA	5.0	NA	5.0
4-Methyl-2-Pentanone	108-10-1	50,000	5,000	NA	10	NA	10
Toluene	108-88-3	500,000	50,000	NA	5.0	NA	5.0
1,1,2-Trichloroethane	79-00-5	1,000	100	NA	5.0	NA	5.0
Tetrachloroethene	127-18-4	1,000	100	NA	5.0	NA	5.0
2-Hexanone	591-78-6	NS	-	NA	10	NA	10
Dibromochloromethane	124-48-1	1,000	100	NA	5.0	NA	5.0
1,2-Dibromoethane	106-93-4	NS	-	NA	5.0	NA	5.0
Chlorobenzene	108-90-7	1,000	100	NA	5.0	NA	5.0
Ethylbenzene	100-41-4	100,000	10,000	NA	5.0	NA	5.0
Xylenes (total)	1330-20-7	67,000	6,700	NA	5.0	NA	5.0
Styrene	100-42-5	100,000	10,000	NA	5.0	NA	5.0
Bromoform	75-25-2	1,000	100	NA	5.0	NA	5.0
Isopropylbenzene	98-82-8	NS	-	NA	5.0	NA	5.0
1,1,2,2-Tetrachloroethane	79-34-5	1,000	100	NA	5.0	NA	5.0
1,3-Dichlorobenzene	541-73-1	100,000	10,000	NA	5.0	NA	5.0
1,4-Dichlorobenzene	106-46-7	100,000	10,000	NA	5.0	NA	5.0
1,2-Dichlorobenzene	95-50-1	50,000	5,000	NA	5.0	NA	5.0
1,2-Dibromo-3-chloropropane	96-12-8	NS	-	NA	5.0	NA	5.0
1,2,4-Trichlorobenzene	120-82-1	100,000	10,000	NA	5.0	NA	5.0
1,2,3-Trichlorobenzene	87-67-6	NS	-	NA	5.0	NA	5.0

[1] Project action limits are based upon NJDEP IGWSCC. "NS" indicates that there is no criteria listed for the analyte.
[2] The project quantiation limits are based upon one-tenth of the IGWSCC.
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for low concentration soil samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for low concentration soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-14
Reference Limits and Evaluation Table

Matrix: Pre-Excavation Soil, Post-Excavation Soil, Post-Treatment Soil
Analytical Group: SVOCs
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)[3]	MDLs (µg/Kg)	QLs (µg/Kg)
Benzaldehyde	100-52-7	NS	-	NA	170	NA	170
Phenol	108-95-2	50,000	5,000	NA	170	NA	170
Bis(2-chloroethyl)ether	111-44-4	10,000	1,000	NA	170	NA	170
2-Chlorophenol	95-57-8	10,000	1,000	NA	170	NA	170
2-Methylphenol	95-48-7	NS	-	NA	170	NA	170
Bis(2-chloroisoproyl)ether	108-60-1	10,000	1,000	NA	170	NA	170
Acetophenone	98-86-2	NS	-	NA	170	NA	170
4-Methylphenol	106-44-5	NS	-	NA	170	NA	170
N-Nitroso-di-n-propylamine	621-64-7	10,000	1,000	NA	170	NA	170
Hexachloroethane	67-72-1	100,000	10,000	NA	170	NA	170
Nitrobenzene	98-95-3	10,000	1,000	NA	170	NA	170
Isophorone	78-59-1	50,000	5,000	NA	170	NA	170
2-Nitrophenol	88-75-5	NS	-	NA	170	NA	170
2,4-Dimethylphenol	105-67-9	10,000	1,000	NA	170	NA	170
Bis(2-chloroethoxy)methane	111-91-1	NS	-	NA	170	NA	170
2,4-Dichlorophenol	120-83-2	10,000	1,000	NA	170	NA	170
Naphthalene	91-20-3	100,000	10,000	NA	170	NA	170
4-Chloroaniline	106-47-8	NS	-	NA	170	NA	170
Hexachlorobutadiene	87-68-3	100,000	10,000	NA	170	NA	170
Caprolactam	105-60-2	NS	-	NA	170	NA	170
4-Chloro-3-methylphenol	59-50-7	100,000	10,000	NA	170	NA	170
2-Methylnaphthalene	91-57-6	NS	-	NA	170	NA	170
Hexachlorocyclopentadiene	77-47-4	100,000	10,000	NA	170	NA	170
2,4,6-Trichlorophenol	88-06-2	10,000	1,000	NA	170	NA	170
2,4,5-Trichlorophenol	95-95-4	50,000	5,000	NA	170	NA	170
1,1'-Biphenyl	92-52-4	NS	-	NA	170	NA	170
2-Chloronaphthalene	91-58-7	NS	-	NA	170	NA	170

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)[3]	MDLs (µg/Kg)	QLs (µg/Kg)
2-Nitroaniline	88-74-4	NS	-	NA	330	NA	330
Dimethyl phthalate	131-11-3	50,000	5,000	NA	170	NA	170
Dinitrotoluene (2,4-/2,6-mixture)	121-14-2 (2,4-) 606-20-2 (2,6-)	10,000	1,000	NA	170	NA	170
Acenaphthylene	208-96-8	NS	-	NA	170	NA	170
3-Nitroaniline	99-09-2	NS	-	NA	330	NA	330
Acenaphthene	83-32-9	100,000	10,000	NA	170	NA	170
2,4-Dinitrophenol	51-28-5	10,000	1,000	NA	330	NA	330
4-Nitrophenol	100-02-7	NS	-	NA	330	NA	330
Dibenzofuran	132-64-9	NS	-	NA	170	NA	170
Diethyl phthalate	84-66-2	50,000	5,000	NA	170	NA	170
Fluorene	86-73-7	100,000	10,000	NA	170	NA	170
4-Chlorophenyl-phenyl-ether	7005-72-3	NS	-	NA	170	NA	170
4-Nitroaniline	100-01-6	NS	-	NA	330	NA	330
4,6-Dinitro-2-methylphenol	534-52-1	NS	-	NA	330	NA	330
N-Nitrosodiphenylamine	86-30-6	100,000	10,000	NA	170	NA	170
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	-	NA	170	NA	170
4-Bromophenyl-phenyl-ether	101-55-3	NS	-	NA	170	NA	170
Hexachlorobenzene	118-74-1	100,000	10,000	NA	170	NA	170
Atrazine	1912-24-9	NS	-	NA	170	NA	170
Pentachlorophenol	87-86-5	100,000	10,000	NA	330	NA	330
Phenanthrene	85-01-8	NS	-	NA	170	NA	170
Anthracene	120-12-7	100,000	10,000	NA	170	NA	170
Carbazole	86-74-8	NS	-	NA	170	NA	170
di-n-Butyl phthalate	84-74-2	100,000	10,000	NA	170	NA	170
Fluoranthene	206-44-0	100,000	10,000	NA	170	NA	170
Pyrene	129-00-0	100,000	10,000	NA	170	NA	170
Butyl benzyl phthalate	85-68-7	100,000	10,000	NA	170	NA	170
3,3'-Dichlorobenzidine	91-94-1	100,000	10,000	NA	170	NA	170
Benzo(a)anthracene	56-55-3	500,000	50,000	NA	170	NA	170
Chrysene	218-01-9	500,000	50,000	NA	170	NA	170
Bis(2-ethylhexyl)phthalate	117-81-7	100,000	10,000	NA	170	NA	170
di-n-Octylphthalate	117-84-0	100,000	10,000	NA	170	NA	170

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)[3]	MDLs (µg/Kg)	QLs (µg/Kg)
Benzo(b)fluoranthene	205-99-2	50,000	5,000	NA	170	NA	170
Benzo(k)fluoranthene	207-08-9	500,000	50,000	NA	170	NA	170
Benzo(a)pyrene	50-32-8	100,000	10,000	NA	170	NA	170
Indeno(1,2,3-cd)pyrene	193-39-5	500,000	50,000	NA	170	NA	170
Dibenzo(a,h)anthracene	53-70-3	100,000	10,000	NA	170	NA	170
Benzo(g,h,i)perylene	191-24-2	NS	-	NA	170	NA	170
2,3,4,6-Tetrachlorophenol	58-90-2	NS	-	NA	170	NA	170

[1] Project action limits are based upon NJDEP IGWSCC. "NS" indicates that there is no criteria listed for the analyte.
[2] The project quantiation limits are based upon one-tenth of the IGWSCC.
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for low concentration soil samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for low concentration soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-15
Reference Limits and Evaluation Table

Matrix: Pre-Excavation Soil, Post-Excavation Soil, Post-Treatment Soil
Analytical Group: Pesticides
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)	MDLs (µg/Kg)	QLs (µg/Kg)
Alpha-BHC	319-84-6	NS	-	NA	1.7	NA	1.7
Beta-BHC	319-85-7	NS	-	NA	1.7	NA	1.7
Delta-BHC	319-86-8	NS	-	NA	1.7	NA	1.7
Gamma-BHC	58-89-9	50,000	5,000	NA	1.7	NA	1.7
Heptachlor	76-44-8	50,000	5,000	NA	1.7	NA	1.7
Aldrin	309-00-2	50,000	5,000	NA	1.7	NA	1.7
Heptachlor epoxide	1024-57-3	NS	-	NA	1.7	NA	1.7
Endosulfan I	959-98-8	50,000	5,000	NA	1.7	NA	1.7
Dieldrin	60-57-1	50,000	5,000	NA	3.3	NA	3.3
4,4'-DDE	72-55-9	50,000	5,000	NA	3.3	NA	3.3
Endrin	72-20-8	50,000	5,000	NA	3.3	NA	3.3
Endosulfan II	33213-65-9	NS	-	NA	3.3	NA	3.3
4,4'-DDD	72-54-8	50,000	5,000	NA	3.3	NA	3.3
Endosulfan sulfate	1031-07-8	NS	-	NA	3.3	NA	3.3
4,4'-DDT	50-29-3	500,000	50,000	NA	3.3	NA	3.3
Methoxychlor	72-43-5	50,000	5,000	NA	17.0	NA	17.0
Endrin ketone	53494-70-5	NS	-	NA	3.3	NA	3.3
Endrin aldehyde	7421-93-4	NS	-	NA	3.3	NA	3.3
Alpha-chlordane	5103-71-9	NS	-	NA	1.7	NA	1.7
Gamma-chlordane	5103-74-2	NS	-	NA	1.7	NA	1.7
Toxaphene	8001-35-2	50,000	5,000	NA	170.0	NA	170.0

[1] Project action limits are based upon NJDEP IGWSCC. "NS" indicates that there is no criteria listed for the analyte.
[2] The project quantiation limits are based upon one-tenth of the IGWSCC.
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for soil samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-16
Reference Limits and Evaluation Table

Matrix: Pre-Excavation Soil, Post-Excavation Soil, Post-Treatment Soil
Analytical Group: PCBs
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (µg/Kg)[1]	Project Quantitation Limit Goal (µg/Kg)[2]	Analytical Method[3]		Achievable Laboratory Limits[4]	
				MDLs (µg/Kg)	Method QLs (µg/Kg)[3]	MDLs (µg/Kg)	QLs (µg/Kg)
Aroclor 1016	12674-11-2	50,000	5,000	NA	33.0	NA	33.0
Aroclor 1221	11104-28-2			NA	33.0	NA	33.0
Aroclor 1232	11141-16-5			NA	33.0	NA	33.0
Aroclor 1242	53469-21-9			NA	33.0	NA	33.0
Aroclor 1248	12672-29-6			NA	33.0	NA	33.0
Aroclor 1254	11097-69-1			NA	33.0	NA	33.0
Aroclor 1260	11096-82-5			NA	33.0	NA	33.0

[1] Project action limits are based upon NJDEP IGWSCC. "NS" indicates that there is no criteria listed for the analyte.
[2] The project quantiation limits are based upon one-tenth of the IGWSCC.
[3] The method QLs listed are the USEPA CLP SOM01.2 contract required quantitation limits for soil samples.
[4] The achievable laboratory limits listed at the USEPA CLP SOM01.2 contract required quantitation limits for soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-17
Reference Limits and Evaluation Table

Matrix: Pre-Excavation Soil, Post-Excavation Soil, Post-Treatment Soil
Analytical Group: Metals
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (mg/Kg)[1]	Project Quantitation Limit Goal (mg/Kg)	Analytical Method[2]		Achievable Laboratory Limits[3]	
				MDLs (mg/Kg)	Method QLs (mg/Kg)	MDLs (mg/Kg)	QLs (mg/Kg)
Aluminum	7429-90-5	NS	-	NA	20	NA	20
Antimony	7440-36-0	NS	-	NA	6	NA	6
Arsenic	7440-38-2	NS	-	NA	1	NA	1
Barium	7440-39-3	NS	-	NA	20	NA	20
Beryllium	7440-41-7	NS	-	NA	0.5	NA	0.5
Cadmium	7440-43-9	NS	-	NA	0.5	NA	0.5
Calcium	7440-70-2	NS	-	NA	500	NA	500
Chromium	7440-47-3	NS	-	NA	1	NA	1
Cobalt	7440-48-4	NS	-	NA	5	NA	5
Copper	7440-50-8	NS	-	NA	2.5	NA	2.5
Cyanide	57-12-5	NS	-	NA	2.5	NA	2.5
Iron	7439-89-6	NS	-	NA	10	NA	10
Lead	7439-92-1	NS	-	NA	1	NA	1
Magnesium	7439-95-4	NS	-	NA	500	NA	500
Manganese	7439-96-5	NS	-	NA	1.5	NA	1.5
Mercury	7439-97-6	NS	-	NA	0.1	NA	0.1
Nickel	7440-02-0	NS	-	NA	4	NA	4
Potassium	7440-09-7	NS	-	NA	500	NA	500
Selenium	7782-49-2	NS	-	NA	3.5	NA	3.5
Silver	7440-22-4	NS	-	NA	1	NA	1
Sodium	7440-23-5	NS	-	NA	500	NA	500
Thallium	7440-28-0	NS	-	NA	2.5	NA	2.5
Vanadium	7440-62-2	NS	-	NA	5	NA	5
Zinc	7440-66-6	NS	-	NA	6	NA	6

[1] There are no criteria listed in the ROD for the inorganic constituents.
[2] The method QLs listed are the USEPA CLP ILM05.4 contract required quantitation limits for soil samples.
[4] The achievable laboratory limits listed at the USEPA CLP ILM05.4 contract required quantitation limits for soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #15-18
Reference Limits and Evaluation Table

Matrix: Pre-Excavation Soil, Post-Excavation Soil, Post-Treatment Soil
Analytical Group: Dioxins/Furans
Concentration Level: Unknown

Analyte	CAS Number	Project Action Limit (ng/Kg)[1]	Project Quantitation Limit Goal (ng/Kg)	Analytical Method[2]		Achievable Laboratory Limits[3]	
				MDLs (ng/Kg)	Method QLs (ng/Kg)	MDLs (ng/Kg)	QLs (ng/Kg)
2,3,7,8-TCDD	1746-01-6	NS	-	NA	1.0	NA	1.0
1,2,3,7,8-PeCDD	40321-76-4	NS	-	NA	5.0	NA	5.0
1,2,3,6,7,8-HxCDD	57653-85-7	NS	-	NA	5.0	NA	5.0
1,2,3,4,7,8-HxCDD	39227-28-6	NS	-	NA	5.0	NA	5.0
1,2,3,7,8,9-HxCDD	19408-74-3	NS	-	NA	5.0	NA	5.0
1,2,3,4,6,7,8-HpCDD	35822-46-9	NS	-	NA	5.0	NA	5.0
OCDD	3268-87-9	NS	-	NA	10	NA	10
2,3,7,8-TCDF	51207-31-9	NS	-	NA	1.0	NA	1.0
1,2,3,7,8-PeCDF	57117-41-6	NS	-	NA	5.0	NA	5.0
2,3,4,7,8-PeCDF	57117-31-4	NS	-	NA	5.0	NA	5.0
1,2,3,6,7,8-HxCDF	57117-44-9	NS	-	NA	5.0	NA	5.0
1,2,3,7,8,9-HxCDF	72918-21-9	NS	-	NA	5.0	NA	5.0
1,2,3,4,7,8-HxCDF	70648-26-9	NS	-	NA	5.0	NA	5.0
2,3,4,6,7,8-HxCDF	60851-34-5	NS	-	NA	5.0	NA	5.0
1,2,3,4,6,7,8-HpCDF	67562-39-4	NS	-	NA	5.0	NA	5.0
1,2,3,4,7,8,9-HpCDF	55673-89-7	NS	-	NA	5.0	NA	5.0
OCDF	39001-02-0	NS	-	NA	10	NA	10
Dioxin TEQ		5,000	-	NA	-	NA	-

[1] The project action level is based upon the ROD; the remediation goal for dioxin TEQ is 5ppb or 5,000µg/Kg in soil. TEQ is calculated by multiplying the concentration of World Health Organization (WHO) listed dioxins and furans by their toxic equivalency factors (TEFs)

[2] The method QLs listed are the USEPA CLP DLM02.0 contract required quantitation limits for soil samples.

[3] The achievable laboratory limits listed at the USEPA CLP DLM02.0 contract required quantitation limits for soil samples. The project laboratory's actual achievable QLs should be equivalent or lower.

QAPP Worksheet #16
Project Schedule / Timeline Table

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
THE PROJECT SCHEDULE IS CONTINUALLY BEING UPDATED AND SUBMITTED TO THE USACE; HENCE IT IS NOT INCLUDED HERE. PLEASE REFER TO THE INDIVUDAL SUBMITTALS OF THE PROJECT SCHEDULE. SAMPLES WILL BE COLLECTED OVER THE DURATION OF THE PROJECT.					

QAPP Worksheet #17
Sampling Design and Rationale

Soil Confirmation Samples of LTTD Treatment Pad and Stockpile/Staging Area

Pre- and post-remedial action testing will be performed at the location of the LTTD treatment pad and surrounding the soil stockpile/staging locations. The results of these analyses will be used to assess if cross-contamination occurred beneath the LTTD treatment pad and stockpile/staging areas. Grab samples will be collected at regular spacing, from a depth interval of 0 to 0.5 feet below grade, as approved by the USACE Contracting Officer. It is anticipated that five samples will be collected pre-remedial action and five samples will be collected from the same locations post-remedial action.

Treatment pad and stockpile/staging area samples will be analyzed on a standard 10 day turn around time. Due to the limited nature of this sampling, field duplicates and matrix spike/matrix spike duplicate (MS/MSD) samples will not be collected. Disposable equipment will be used when possible to avoid the need for equipment blanks.

Samples will be collected and analyzed for VOCs, semi-volatile organic compounds (SVOCs), pesticides, PCBs, dioxins/furans, metals, and cyanide. The results of these analyses will be compared to the NJDEP IGWSCC and the ROD criteria for dioxins/furans. If post-remedial action sampling results are above the action levels, Sevenson may be required to perform excavations with USACE approval until the action levels are achieved, or as directed by the USACE.

Pre-Excavation Soil Sampling – PDI Boring SB39

Pre-excavation soil sampling within the known limits of contamination is limited to a total of four samples for dioxin/furan testing. The samples will be collected proximate to PDI soil boring SB39, collected from each corner of a 10-foot by 10-foot square established around the boring, with the existing boring point at the center.

The pre-excavation samples will be analyzed on a 48 hour turn around time. Due to the limited nature of this sampling, field duplicates and MS/MSD samples will not be collected. Disposable equipment will be used when possible to avoid the need for equipment blanks.

Samples will be collected and analyzed for dioxins/furans. The results of these analyses will be compared to the ROD criteria of 5ppb TEQ.

Pre-Excavation Soil Sampling – Northern Site Boundary

The Contract Drawings (see Appendix 1: Sample Grid Layout) indicate that the contaminated soil extends beyond the northern site boundary, adjacent to the Conrail railroad tracks. Pre-excavation soil samples will be collected outside of the site boundary in order to delineate and remediate any site-related contaminants that are identified on the Conrail property. Prior to conducting any sampling activities on the Conrail property, the USEPA will obtain access agreements. Pre-excavation sample locations and depths will be determined by the USACE Contracting Officer.

Pre-excavation samples will be analyzed on a standard 10 day turn around time. Field QC sample collection is summarized in Worksheet #20 and each field QC sample type is defined in Worksheet #28 of this QAPP. Field duplicates will be taken for every tenth field sample. MS/MSD samples will be taken at the rate of at least once every 20 samples. Disposable equipment will be used when possible to avoid the need for equipment blanks.

Pre-excavation samples will be collected and analyzed for VOCs, SVOCs, pesticides, PCBs, dioxins/furans, metals, and cyanide. The results of these analyses will be compared to the NJDEP IGWSCC and the ROD criteria for dioxins/furans. Locations of samples shall be marked in the field and documented on the as-build drawings.

Post-Excavation Confirmation Samples

Excavations at the Cornell-Dubilier Site require verification in accordance with the NJDEP post remedial action requirements defined in N.J.A.C. 7:26E, Subchapter 6.4. As required by the NJDEP technical requirements, each excavation area will be sampled at discrete sidewall and excavation bottom locations. For excavations less than or equal to 20 feet in perimeter, at least one bottom sample and one sidewall sample will be collected and analyzed, biased in the direction of surface runoff. The excavation perimeter will be measured at the top of the excavation.

Post-excavation sample locations and depths shall be grab samples biased towards areas and depths of suspected highest concentration. Sampling bias will be based on analytical results from previous sampling events or where visual suspect contamination is apparent. In the event that no level of biased concentrations can be pre-determined, samples will be taken every 60 linear feet for sidewall base samples and one bottom sample from the excavation bottom for every 60 by 60 foot grid, or every 3,600 square feet or excavation floor.

Post-excavation samples will be analyzed on a 48-hour turn around time. Field QC sample collection is summarized in Worksheet #20 and each field QC sample type is defined in Worksheet #28 of this QAPP. Field duplicates will be taken for every tenth field sample. MS/MSD samples will be taken at the rate of at least once every 20 samples. Disposable equipment will be used when possible to avoid the need for equipment blanks.

Post-excavation samples will be collected and analyzed for VOCs, SVOCs, pesticides, PCBs, dioxins/furans, metals, and cyanide after pre-delineated contamination from the primary excavation areas is removed. The results of these analyses will be compared to the NJDEP IGWSCC and the ROD criteria for dioxins/furans. If post-excavation sampling results are above the action levels, Sevenson will continue to perform secondary excavations with USACE approval until the action levels are achieved, or as directed by the USACE. Locations of samples shall be marked in the field and documented on the as-build drawings.

Post-LTTD Treatment Samples

The output of the onsite LTTD unit will be used as onsite backfill following treatment. Prior to reuse, samples of output will be analyzed to confirm that they are free from chemical contamination as defined in N.J.A.C. 7:26D.

In order to be used as onsite backfill, the treated material will meet the requirements described in Section 02320 of the project specification and the requirements defined in the NJDEP Soil Cleanup Criteria. The material will be sampled and analyzed to verify that the soil is clean for the intended use.

Soil treated onsite will be stockpiled at a designated onsite location. One sample will be collected from the treated stockpile for each day that the LTTD unit is operational. Additional samples may be collected and analyzed as requested by the USACE.

Treated stockpile samples will be analyzed on a 24 hour turn around time. Field QC sample collection is summarized in Worksheet #20, and each field QC sample type is defined in Worksheet #28 of this QAPP. Field duplicates will be collected every tenth field sample. MS and MSD samples will be taken at the rate of at least once every 20 samples. Disposable equipment will be used when possible to avoid the need for equipment blanks.

Treated material samples will be analyzed for VOCs, SVOCs, pesticides, PCBs, dioxins/furans, metals, and cyanide. The results of these analyses will be compared to the NJDEP IGWSCC and the ROD criteria for dioxins/furans. Samples meeting the criteria will be used as onsite backfill. Sample results exceeding criteria will be considered unacceptable as backfill without additional treatment. If the sample results exceed the criteria, consideration may also be given to offsite disposal of the affected stockpiled material.

Waste Characterization Samples

Waste characterization samples will be collected from excavated soil and debris which are determined to not be suitable for treatment in the onsite LTTD unit, and from containerized liquid wastes (i.e., decontamination wastewater and water removed from the excavations) to adequately classify waste materials for proper disposal.

Soil and debris not treated onsite will be stockpiled at a designated onsite location. Representative soil samples will be collected from the stockpiled to effectively characterize the materials. Prior to sampling, the volume of soil in the stockpiles will be visually estimated to plan the number of samples that are to be collected. At a minimum, one sample for each 250yd^3 of stockpiled soil will be collected.

Liquid wastes generated during site activities will be containerized in an aboveground storage tank. At a minimum, one sample will be collected from each 20,000 gallon storage tank.

Solid and liquid waste characterization samples will be analyzed for TCLP parameters (VOCs, SVOCs, pesticides, herbicides, and metals), total PCBs, corrosivity, ignitability, reactive cyanide, and reactive sulfide. The samples will be shipped to the laboratory for analysis on a standard 10 day turn around time. Field QC sample collection is summarized in Worksheet #20, and each field QC sample type is defined in Worksheet #28 of this QAPP. Disposable equipment will be used when possible to avoid the need for equipment blanks.

Offsite Backfill Sampling

It is anticipated that the majority of the backfill needed for site restoration will be obtained from the treated output of the onsite LTTD unit. As necessary, backfill material consisting of common and structural fill, standard topsoil, and crushed stone will be obtained from offsite sources. Samples of backfill materials will be analyzed to confirm that they are free from chemical contamination as defined in N.J.A.C. 7:26D.

Offsite backfill materials will be acquired from local, USACE-approved, borrow sources. The backfill material will meet the requirements described in Section 02320 of the project specification and the requirements defined in the NJDEP Soil Cleanup Criteria. The fill material will be sampled and analyzed to verify that the soil is clean for the intended use.

A minimum of one sample per every 5,000yd^3 of backfill material and no less than one sample per borrow area will be collected. Additional samples may be collected and analyzed as requested by the USACE.

Backfill material samples will be analyzed for VOCs, SVOCs, pesticides, PCBs, metals, and cyanide. The results of these analyses will be compared to the NJDEP RDCSCC. Sample results exceeding criteria will be considered unacceptable as topsoil or backfill.

Backfill samples will be analyzed on a standard 10 day turn around time. Field QC sample collection is summarized in Worksheet #20, and each field QC sample type is defined in Worksheet #28 of this QAPP. Field duplicates will be collected every tenth field sample. MS/MSD samples will be taken at the rate of at least once every 20 samples. Disposable equipment will be used when possible to avoid the need for equipment blanks.

QAPP Worksheet #18
Sampling Locations and Methods/SOP Requirements Table

Sampling Location/AOC	Matrix	Depth	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference	Rationale for Sampling Location
Waste characterization samples	Solid and aqueous	NA	TCLP analytes (VOCs, SVOCs, pesticides, herbicides, metals), PCBs, and RCRA waste characteristics (corrosivity, ignitability, reactivity)	Unknown	Approximately 125 samples; no field duplicate samples required	FSP Sections 4.4, 4.5	Characterize waste for proper disposal
Offsite backfill and topsoil	Soil	NA	VOCs, SVOCs, Pesticides, PCBs, Metals, Cyanide	Unknown	Determined in the field based on the amount of offsite source material required. It is expected that all backfill requirements will be met using the soil treated onsite in the LTTD unit.	FSP Section 4.8	Verify topsoil and backfill from offsite sources do not contain contaminant levels that are hazardous to human health or the environment
Post-excavation confirmation samples	Soil	TBD	VOCs, SVOCs, Pesticides, PCBs, Dioxins/Furans, Metals, Cyanide	Unknown	Approximately 170 sidewall samples and 380 excavation bottom samples; approximately 55 field duplicate samples	FSP Section 4.6	Confirm that contaminated soil has been removed
Post-LTTD treatment samples	Soil	NA	VOCs, SVOCs, Pesticides, PCBs, Dioxins/Furans, Metals, Cyanide	Unknown	Approximately 260 samples; approximately 26 field duplicate samples	FSP Section 4.7	Confirm than soil treated in the onsite LTTD unit has been treated adequately to be used as onsite backfill
Pre-excavation soil samples – PDI Boring SB39	Soil	TBD	Dioxins/Furans	Unknown	4 samples; no field duplicate samples required	FSP Section 4.1	Further characterize the soil proximate to PDI soil boring number SB39

Sampling Location/AOC	Matrix	Depth	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference	Rationale for Sampling Location
Pre-excavation soil samples – northern site boundary	Soil	TBD	VOCs, SVOCs, Pesticides, PCBs, Dioxins/Furans, Metals, Cyanide	Unknown	Number of samples to be determined by USACE Contracting Officer; field duplicates collected at the rate of 10% of the field samples collected	FSP Section 4.2	Delineate site-related contaminants that are identified on the Conrail property located along the northern site boundary
LTTD treatment pad and soil stockpile/staging areas	Soil	0-0.5 feet below grade	VOCs, SVOCs, Pesticides, PCBs, Dioxins/Furans, Metals, Cyanide	Unknown	Five samples pre-remediation and five samples post-remediation; no field duplicate samples required	FSP Section 4.3	Assess if cross-contamination occurred beneath the LTTD treatment pad and stockpile/staging areas during remedial activities

QAPP Worksheet #19
Analytical SOP Requirements Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference[1]	Sample Volume	Containers[2] (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Soil for Waste Characterization	Ignitability	Unknown	SW-846 1010	NA	1, 32oz. G	Cool 4°C	7 days
	Corrosivity (i.e., pH)	Unknown	SW-846 9045C	NA			14 days
	Reactive Cyanide	Unknown	SW-846 Section 7.4.3.2/Method 9014	NA			7 days
	Reactive Sulfide	Unknown	SW-846 Section 7.4.4.3/Method 9034	NA			7 days
	TCLP Metals, Mercury	Unknown	SW-846 1311/3015/6010B/7470A or ILM05.4	60g			180 days 28 days for mercury
	TCLP SVOCs	Unknown	SW-846 1311/3510C/8270C or SOM01.2	60 g			14/7/40 days
	TCLP Pesticides	Unknown	SW-846 1311/3510C/8081A or SOM01.2				14/7/40 days
	TCLP Herbicides	Unknown	SW-846 1311/3510C/8151A or SOM01.2				14/7/40 days
	PCBs	Unknown	SW-846 3550C/8082 or SOM01.2	60g	1, 8oz. G		14/40 days
	TCLP VOCs	Unknown	SW-846 1311/5030B/8260B or SOM01.2	5g	2, 4oz. GT		14/14 days
Wastewater	Ignitability	Unknown	SW-846 1010	NA	1, 1L AG	Cool 4°C	7 days
	Corrosivity (i.e., pH)	Unknown	SW-846 9045C	NA			Immediately
	Reactive Cyanide	Unknown	SW-846 Section 7.4.3.2/Method 9014	NA			7 days

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference[1]	Sample Volume	Containers[2] (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
	Reactive Sulfide	Unknown	SW-846 Section 7.4.4.3/Method 9034	NA			7 days
	TCLP Metals, Mercury	Unknown	SW-846 1311/3015/6010B/7470A or ILM05.4	60g			180 days, 28 days for mercury
	TCLP SVOCs	Unknown	SW-846 1311/3510C/8270C or SOM01.2	60 g			14/7/40 days
	TCLP Pesticides	Unknown	SW-846 1311/3510C/8081A or SOM01.2				14/7/40 days
	TCLP Herbicides	Unknown	SW-846 1311/3510C/8151A or SOM01.2				14/7/40 days
	PCBs	Unknown	SW-846 3550C/8082 or SOM01.2	60g	1, 1L AG		7/40 days
	TCLP VOCs	Unknown	SW-846 1311/5030B/8260B or SOM01.2	5g	2, 40mL GT		14/14 days
Soil	VOCs	Unknown	SW-846 5035/8260B or SOM01.2	5g	2, 5g Encore samplers 2, 2oz. GT	Cool 4°C	48 hours to Encore transfer 14 days to analysis
	SVOCs	Unknown	SW-846 3550C/8270C or SOM01.2	60g	2, 32oz. G		14/40 days
	Pesticides	Unknown	SW-846 3550C/8081A or SOM01.2	60g			14/40 days
	PCBs	Unknown	SW-846 3550C/8082 or SOM01.2				14/40 days
	Cyanide	Unknown	SW-846 Method 9014	60g			14 days
	Metals	Unknown	SW-846 3050/6010B/7471A or ILM05.4	60g			180 days 28 days for mercury

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference[1]	Sample Volume	Containers[2] (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
	Dioxins/Furans	Unknown	SW-846 8290 or DLM02.0	NA	1, 4oz. AG		30/45 days

[1]Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).
[2] G = clear glass; T = Teflon lined lid; P = plastic; AG = amber glass

QAPP Worksheet #20
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Conc. Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of MS/MSD	No. of Field Blanks	No. of Equip. Blanks	No. of Trip Blank Samples	Total No. of Samples to Lab
Waste characterization samples: solid and aqueous	TCLP Metals, Mercury	Unknown	SW846 1311 plus SW846 6010B/7470A or ILM05.4	Approximately 125	0	0	0	0	0	Approximately 125
	TCLP VOCs	Unknown	SW846 1311 plus SW846 8260B or SOM01.2							
	TCLP SVOCs	Unknown	SW846 1311 plus SW846 8270C or SOM01.2							
	TCLP Pesticides	Unknown	SW846 1311 plus SW846 8081A or SOM01.2							
	TCLP Herbicides	Unknown	SW846 1311 plus SW846 8151A or SOM01.2							
	PCBs	Unknown	SW846 8082 or SOM01.2							
	Reactive Cyanide	Unknown	SW-846 Section 7.4.3.2/Method 9014							
	Reactive Sulfide	Unknown	SW-846 Section 7.4.4.3/Method 9034							
	Ignitability	Unknown	SW-846 1010							
	Corrosivity (i.e., pH)	Unknown	SW-846 9045C							
Offsite backfill and topsoil	VOCs	Unknown	SW846 8260B or SOM01.2	See footnote 1	10%	5%	0	0	0	See footnote 1
	SVOCs	Unknown	SW846 8270C or SOM01.2							

Matrix	Analytical Group	Conc. Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of MS/MSD	No. of Field Blanks	No. of Equip. Blanks	No. of Trip Blank Samples	Total No. of Samples to Lab
	Pesticides	Unknown	SW846 8081A or SOM01.2							
	PCBs	Unknown	SW846 8082 or SOM01.2							
	Metals, Cyanide	Unknown	SW846 6010B/7470A/9014 or ILM05.4							
Post-excavation confirmation samples	VOCs	Unknown	SW846 8260B or SOM01.2	Approximately 550	55	28	0	0	0	Approximately 633
	SVOCs	Unknown	SW846 8270C or SOM01.2							
	Pesticides	Unknown	SW846 8081A or SOM01.2							
	PCBs	Unknown	SW846 8082 or SOM01.2							
	Dioxins/Furans	Unknown	SW846 8290 or DLM02.0							
	Metals, Cyanide	Unknown	SW846 6010B/7470A/9014 or ILM05.4							
Post-LTTD treatment samples	VOCs	Unknown	SW846 8260B or SOM01.2	Approximately 260	26	13	0	0	0	Approximately 299
	SVOCs	Unknown	SW846 8270C or SOM01.2							
	Pesticides	Unknown	SW846 8081A or SOM01.2							
	PCBs	Unknown	SW846 8082 or SOM01.2							
	Dioxins/Furans	Unknown	SW846 8290 or DLM02.0							

Matrix	Analytical Group	Conc. Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of MS/MSD	No. of Field Blanks	No. of Equip. Blanks	No. of Trip Blank Samples	Total No. of Samples to Lab
	Metals, Cyanide	Unknown	SW846 6010B/7470A/9014 or ILM05.4							
Pre-excavation soil samples – PDI Boring SB39	Dioxins/Furans	Unknown	SW846 8290 or DLM02.0	4	0	0	0	0	0	4
Pre-excavation soil samples – northern site boundary	VOCs	Unknown	SW846 8260B or SOM01.2	See footnote 2	10%	5%	0	0	0	See footnote 2
	SVOCs	Unknown	SW846 8270C or SOM01.2							
	Pesticides	Unknown	SW846 8081A or SOM01.2							
	PCBs	Unknown	SW846 8082 or SOM01.2							
	Dioxins/Furans	Unknown	SW846 8290 or DLM02.0							
	Metals, Cyanide	Unknown	SW846 6010B/7470A/9014 or ILM05.4							
LTTD treatment pad and soil stockpile/staging areas	VOCs	Unknown	SW846 8260B or SOM01.2	10	0	0	0	0	0	10
	SVOCs	Unknown	SW846 8270C or SOM01.2							
	Pesticides	Unknown	SW846 8081A or SOM01.2							
	PCBs	Unknown	SW846 8082 or SOM01.2							
	Dioxins/Furans	Unknown	SW846 8290 or DLM02.0							

Matrix	Analytical Group	Conc. Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of MS/MSD	No. of Field Blanks	No. of Equip. Blanks	No. of Trip Blank Samples	Total No. of Samples to Lab
	Metals, Cyanide	Unknown	SW846 6010B/7470A/9014 or ILM05.4							

[1] Determined in the field based on the amount of offsite source material required (one sample per 5000yd^3). It is expected that all backfill requirements will be met using the soil treated onsite in the LTTD unit.

[2] Number of samples to be determined in the field by the USACE Contracting Officer.

QAPP Worksheet #21
Project Sampling SOP References Table

Reference Number	Title, Revision Date, and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
SOP HW-32	Region 2 Policy for Implementing the National Strategy for Procuring Analytical Services for all OSWER Programs (Superfund, RCRA, and Brownfields), Revision 6, December 2006	USEPA Region 2	See SOP	No	To be used as a guide for procuring the analytical laboratory for the project.
EPA 540-R-07-06	Contract Laboratory Program Guidance for Field Samplers, EPA 540-R-07-06, Final July 2007	USEPA	Notebook, computer, safety glasses, ice, sample labels, and other materials described in the document	No	To be used by the field team as a guide for collecting and preparing CLP samples.
NA	NJDEP Field Sampling Procedures Manual, August 2005	NJDEP	Sample collection and processing equipment	No	To be used by the field team as a guide to collecting samples. Sampling methodology included in the FSP based on the procedures included in this manual.
NA	Field Sampling Plan for the Cornell-Dubilier Electronics Superfund Site, OU-2 Soil Remediation, October 2008	Sevenson	Sample collection and processing equipment	Yes	Attachment to the QAPP

QAPP Worksheet #22
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[1]
NOT APPLICABLE – NO FIELD ANALYSIS WILL BE CONDUCTED									

QAPP Worksheet #23
Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
SOM01.2	USEPA Multi-Media, Multi-Concentration, Organic Analytical Service for Superfund (SOM01.1), May 2005, including Modifications Updating SOM01.1 to SOM01.2, October 2006	Definitive	VOCs, SVOCs, PCBs, Pesticides, Herbicides	GC-MS GC-ECD	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
ILM05.4	USEPA Multi-Media, Multi-Concentration, Inorganic Analytical Service for Superfund (ILM05.3), March 2004	Definitive	Metals	ICP-AES CVAA	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
DLM02.0	USEPA Multi-Media, Multi-Concentration, Dioxin and Furan Analytical Service for Superfund (DLM02.0), May 2005	Definitive	Dioxins/Furans	HRGC-HRMS	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
SW846 8081B	Organochlorine Pesticides by Gas Chromatography, Revision 2, February 2007	Definitive	Pesticides	GC-ECD	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
SW846 8082	Polychlorinated Biphenyls (PCBs) by Gas Chromatography, Revision 1, February 2007	Definitive	PCBs	GC-ECD	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
SW846 8260B	Volatile Organics by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 2, December 1996	Definitive	VOCs	GC-MS	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
SW846 8270D	Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 4, February 2007	Definitive	SVOCs	GC-MS	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
SW846 8290A	Polychlorinated Dibenzo-p-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry (HRGC/HRMS), Revision 1, February 2007	Definitive	Dioxins/Furans	HRGC-HRMS	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
SW846 6010C	Inductively Coupled Plasma-Atomic Emission Spectrometry, Revision 3, February 2007	Definitive	Metals	ICP-AES	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
SW846 7471B	Mercury in Solid or Semisolid Waste (Manual Cold Vapor Technique), Revision 2, February 2007	Definitive	Mercury	CVAA	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
M-8151A-05-XX	Chlorinated Herbicides by GC Using Methylation or Pentafluorobenzylation Derivatization, Revision 1, December 1996	Definitive	Herbicides	GC	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
SW846 1010A	Test Method for Flash Point by Pensky-Martens Closed Cup Tester, Revision 1, November 2007	Definitive	Ignitability	Pensky Martens	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
SW846 9045D	Soil and Waste pH, Revision 4, November 2004	Definitive	pH	pH Meter	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
SW846 Section 7.3	Characteristics Introduction and Regulatory Definitions, Revision 4, November 2004	Definitive	Reactive Cyanide	Distillation, Colorimetric	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N
SW846 Section 7.3	Characteristics Introduction and Regulatory Definitions, Revision 4, November 2004	Definitive	Reactive Sulfide	Distillation, Redox	USEPA-CLP, DESA, or subcontract lab to be chosen as directed by USEPA Region 2	N

QAPP Worksheet #24
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/MS (VOC)	BFB tuning	Prior to initial calibration and calibration verification (every 12 hours)	Refer to criteria listed in the method	Retune instrument and verify	Laboratory analyst	SW846 8260B
	Multipoint initial calibration (minimum five points)	Prior to sample analysis or when calibration verification fails	SPCCs average RF ≥0.050 and %RSD for RFs for CCCs ≤30% and one option below: **Option 1:** All analytes ≤15% RSD **Option 2:** Least squares regression r ≥0.990	Correct the problem and repeat the initial calibration.	Laboratory analyst	
	Second source calibration verification	Once after each multipoint initial calibration	All analytes within ±25% of expected value	Correct the problem and repeat initial calibration.	Laboratory analyst	
	Continuing calibration verification	At the start of each analytical sequence and every 12 hours thereafter	SPCCs Average RF ≥0.050 and %D for RFs for CCCs ≤20% All other analytes within ±20% of expected value	Correct the problem, then recalibrate and reanalyze all samples since the last acceptable continuing calibration verification	Laboratory analyst	
GC/MS (VOC, DESA/USEPA CLP Laboratory)	SOM01.2	SOM01.2	SOM01.2	SOM01.2	Laboratory analyst	SOM01.2

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/MS (SVOC)	DFTPP tuning	Prior to initial calibration and calibration verification (every 12 hours)	Refer to criteria listed in the method	Retune instrument and verify	Laboratory analyst	SW846 8270C
	Multipoint initial calibration (minimum five points)	Prior to sample analysis or when calibration verification fails	SPCCs average RF ≥0.050 and %RSD for RFs for CCCs ≤30% and one option below: **Option 1:** All analytes ≤15% RSD **Option 2:** Least squares regression r ≥0.990	Correct the problem and repeat the initial calibration.	Laboratory analyst	
	Second source calibration verification	Once after each multipoint initial calibration	All analytes within ±25% of expected value	Correct the problem and repeat initial calibration.	Laboratory analyst	
	Continuing calibration verification	At the start of each analytical sequence and every 12 hours thereafter	SPCCs Average RF ≥0.050 and %D for RFs for CCCs ≤20% All other analytes within ±20% of expected value	Correct the problem, then recalibrate and reanalyze all samples since the last acceptable continuing calibration verification	Laboratory analyst	
GC/MS (SVOC, DESA/USEPA CLP Laboratory)	SOM01.2	SOM01.2	SOM01.2	SOM01.2	Laboratory analyst	SOM01.2

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/ECD (pesticides and PCBs)	Multipoint initial calibration (minimum five points) for single response pesticides; single-point calibration for toxaphene and chlordane; multipoint calibration for aroclors 1016 and 1260 only, but include midpoint standard for all other aroclors. Only a linear curve model is allowed, no use of higher order curve can be used.	Prior to sample analysis, or when calibration verification fails	To use average RRF for quantitation of any analyte, %RSD must be ≤20%; otherwise use calibration curve with coefficiant of correlation or determination ≥0.99	Correct the problem and repeat the initial calibration.	Laboratory analyst	SW846 8081A and 8082
	Second source calibration verification – pesticides and aroclors 1016 and 1260 (or aroclors identified in the sample)	Once for each multipoint initial calibration	All analytes within ±15% of expected value	Correct the problem, then recalibrate and reanalyze all samples since the last acceptable continuing calibration verification	Laboratory analyst	
	Continuing calibration verification – pesticides and aroclors 1016 and 1260 (or aroclors identified in the samples)	At the start of each analytical sequence, after 12 hours or 10 samples whichever is more frequent, and at the end of the sequence	All analytes within ±15% of expected value	Correct the problem, then recalibrate and reanalyze all samples since last acceptable continuing calibration verification.	Laboratory analyst	
GC/ECDS (pesticides and PCBs, DESA/USEPA CLP Laboratory)	SOM01.2	SOM01.2	SOM01.2	SOM01.2	Laboratory analyst	SOM01.2

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
ICP (metals)	Initial calibration (a blank and at least one standard)	Before sample analysis, every 24 hours, whenever modifications are made to the system, or when continuing calibration verification fails	If more than one standard is used, correlation coefficient must be ≥0.995	Correct problem and repeat initial calibration.	Laboratory analyst	SW846 6010B
	Second source calibration verification	Once after each initial calibration, prior to sample analysis	Value of second source for all analytes within ±10% of expected value.	Correct problem and repeat initial calibration.	Laboratory analyst	
	Calibration blank	After every 10 samples and at the end of a sequence	No analytes detected at or above ½ the reporting limit	Correct the problem, then reanalyze previous 10 samples	Laboratory analyst	
	Continuing calibration verification	After every 10 samples and at the end of the analysis sequence	All analytes within ±10% of the expected value	Recalibrate and reanalyze all samples since last successful continuing calibration verification.	Laboratory analyst	
ICP (metals, DESA/USEPA CLP laboratory)	ILM05.4	ILM05.4	ILM05.4	ILM05.4	Laboratory analyst	ILM05.4
CVAA (mercury)	Initial calibration (a blank and 5 standards)	Before sample analysis, every 24 hours, whenever modifications are made to the system, or when continuing calibration verification fails	Correlation coefficient must be ≥0.995	Correct problem and repeat initial calibration	Laboratory analyst	SW846 7471A

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
	Second source calibration verification	Immediately following each initial calibration	All analytes within ±10% of expected value	Correct problem and repeat initial calibration	Laboratory analyst	
	Calibration blank	Before any sequence, after every 10 samples, and at the end of a sequence	No analytes detected at or above ½ the reporting limit	Correct the problem, then reanalyze previous 10 samples	Laboratory analyst	
	Continuing calibration verification	After every 10 samples and at the end of the analysis sequence	All analytes within ±20% of expected value	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification	Laboratory analyst	
CVAA (mercury, DESA/USEPA CLP laboratory)	ILM05.4	ILM05.4	ILM05.4	ILM05.4	Laboratory analyst	ILM05.4
Cyanide	Initial multipoint calibration (minimum six standards and a calibration blank)	Initial daily calibration before sample analysis	Correlation coefficient ≥0.995 for linear regression	Correct problem then repeat initial calibration. Note: plot of absorbance versus concentration may be nonlinear	Laboratory analyst	SW846 9014
	Distilled standards (one high and one low)	Once per initial multipoint calibration	Value within ±15% of true value	Correct problem then repeat distilled standard	Laboratory analyst	

QAPP Worksheet #25
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

All laboratory analytical equipment will undergo maintenance and testing procedures in accordance with the laboratory SOPs. Laboratory SOPs must be compliant with minimum method requirements. Some typical maintenance and testing activities are included in the following table.

Instrument/ Equipment	Frequency	Maintenance, Testing, or Inspection Activity	Responsible Person	SOP Reference
Gas Chromatography (GC) and Gas Chromatography/Mass Spectroscopy (GC/MS)	Daily	Purge traps are baked out; changes of the traps are logged.	Laboratory analyst	SW846 8260B, 8270C, 8081A, 8082 SOM01.2
		Columns are baked out.		
		Volume of gas cylinders is checked.		
	As Required	Teflon ferrules are replaced.		
		Injection port liners are cleaned or replaced.		
		GC septa are changed after 50 injections.		
		Detectors are baked out.		
	Quarterly	Instrument electronics are visually inspected and cleaned.		
		Detectors are cleaned as recommended by the manufacturer or more frequently as needed.		
	Annually	Electron capture detectors are wipe tested.		
		Preventative maintenance performed by manufacturer as per service contract terms.	Manufacturer representative	
Inductively Coupled Plasma Spectrometer (ICP)	Daily	Volume of gas cylinders in checked.	Laboratory analyst	SW846 6010B ILM05.4
		Monitor detector response and instrument performance through calibration and verification.		
	As Required	Clean nebulizer and spray chamber.		
		Replace peristaltic pump tubing.		
		Clean plasma torch assembly when discoloration is evident or after analyzing samples with high dissolved solids.		
Atomic Absorption (AA)/Graphite Furnace	Daily	Warm up AA lamp for 15 minutes prior to analysis.	Laboratory analyst	SW846 7471A ILM05.4
		Check and align source lamp.		
		Check autosampler alignment and deposition.		
	As Required	Change graphite contact rings.		
		Change background correction lamp.		
		Clean furnace housing and injector tip.		
		Replace pyrollytic graphite furnace tubes as indicted by instrument performance.		

QAPP Worksheet #26
Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Sevenson field team
Sample Packaging (Personnel/Organization): Sevenson field team
Coordination of Shipment (Personnel/Organization): Sevenson field team
Type of Shipment/Carrier: Federal Express or UPS for Overnight Delivery or courier to the laboratory
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Assigned USEPA CLP laboratory, DESA laboratory, or subcontract laboratory personnel
Sample Custody and Storage (Personnel/Organization): Assigned USEPA CLP laboratory, DESA laboratory, or subcontract laboratory personnel
Sample Preparation (Personnel/Organization): Assigned USEPA CLP laboratory, DESA laboratory, or subcontract laboratory personnel
Sample Determinative Analysis (Personnel/Organization): Assigned USEPA CLP laboratory, DESA laboratory, or subcontract laboratory personnel
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): Samples will not be stored in the field, but will be shipped within 24 hours of collection. If in an emergency they are stored in the field, they will be kept in a cooler or transferred to a refrigerator kept at 4°C. Laboratory sample custodian will store samples at the laboratory for 30 days after the final report has been submitted to Sevenson.
Sample Extract/Digestate Storage (No. of days from extraction/digestion): Sample extraction and digestion must be conducted according to the USEPA CLP SOWs and the requirements given in Worksheet #19. Laboratory analytical technicians will store all extracts/digestates for 30 days after the final report has been submitted to Sevenson.
Biological Sample Storage (No. of days from sample collection): Not applicable
SAMPLE DISPOSAL
Personnel/Organization: Assigned USEPA CLP laboratory, DESA laboratory, or subcontract laboratory personnel
Number of Days from Analysis: Samples may not be disposed of prior to 30 days after final report has been submitted to Sevenson.

QAPP Worksheet #27
Sample Custody Requirements

Proper sample handling, shipment, and maintenance of a chain of custody (COC) are key components of building the documentation and support for data that can be used to make project decisions. It is important that sample handling and sample COC requirements are performed completely, accurately, and consistently. A COC record establishes the documentation necessary to trace sample possession from tme of collection through sample analysis and disposition.

A sample is considered to be in someone's custody if it:

- Is in his/her possession.
- Is in his/her view, after being in his/her possession.
- Is in his/her possession and has been placed in a secure area.
- Is in a designated secure area.

Field Logbooks/Documentation

The sequentially numbered field logbook will provide the means of recording data collection activities performed. As such, logbook entries will be described in as much detail as possible so that particular site activities could be reconstructed without reliance on memory.

Field logbooks will be bound logbooks, field survey books, or notebooks. Logbooks will be assigned to field personnel, but will be stored in the document control center when not in use.

A project-specific document number will be used to identify each logbook. The title page of each logbook will contain the following information:

- Person to whom the logbook is assigned.
- Logbook number.
- Project name.
- Project start date.
- Project end date.

Entries into the logbook will contain a variety of information. The beginning of each entry will include: the date, start time, weather conditions, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry. The names of visitors to the site (including additional field sampling or investigative team personnel), and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded in the field logbook. All entries will be made in ink and no erasures will be made. If an incorrect entry is made, the incorrect information will be crossed out with a single strike mark and initialed. Whenever a sample is collected or a measurement is made, a detailed description of the location of the station will be recorded in the logbook. The number of photographs taken at the station, if any, will also be noted. The logbook will identify all equipment used to make measurements.

Samples will be collected in accordance with the sampling procedures documented in the Field Sampling Plan. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth of sample collection, volume, and the number of sample containers. The corresponding sample identification number will be prominently listed.

Field Procedures

The field sampler will be personally responsible for the care and custody of the samples until the samples are transferred or properly dispatched. As few people as possible will handle the samples. The CQCSM

will review all field activities to determine whether proper custody procedures were followed during the fieldwork and decide if additional samples are required.

Sample Labeling

Self-adhesive labels will be affixed to each sample container. The sample label will be completed in indelible ink and will include the following information:

- Project name
- Sample ID number
- Date and time of sample collection
- Sampler's initials
- Sample type (i.e., matrix)
- Preservative used, if any
- Analyses requested

Sample labels will be affixed to the sample containers and covered with clear packaging tape.

Chain of Custody Procedures

The COC form serves as an official communication to the laboratory detailing the particular analyses required for each sample. The COC record will accompany the samples from the time of sampling through all transfers of custody. The sample collector will complete a COC record to accompany each delivery container and will be responsible for shipping samples to the laboratory.

When samples are being submitted to a USEPA CLP laboratory, the COC must be generated as per USEPA Forms II Lite software. Each CLP sample will have a CLP number assigned in addition to the field sample identification number. In the case of CLP samples, a copy of the COC created by Forms II Lite must be sent to the USEPA CLP Region 2 coordinator.

If samples are submitted to a subcontracted laboratory, manual COC forms will be completed. An example COC form is included in Appendix 3. The COC form and sample shipment documentation will be faxed to the laboratory when samples are shipped. The following information is typically recorded on manual COC forms:

- Project name and/or project number
- Signature of field sampler
- Field sample identification number
- Date and time of sample collection
- Grab or composite sample designation
- Sample matrix
- Analyses required
- Preservation technique
- Signatures and dates for transfer of custody
- Air express/shipper's bill of lading identification number

Lines not used on the COC record will be crossed out. A second member of the field sampling team will review the completed COC record to assure that required information is not omitted and that unused lines are crossed out. The original signature copy of the COC record will be enclosed in a plastic bag and secured to the inside of the cooler lid. A copy of the COC record will be retained for project files.

Packaging and Shipping Procedures

As an aid to field personnel and as part of the site QC inspections, Sevenson Checklist Number 007, "Task Specific QC Checklist – Packing, Storing, and Shipment of Samples" and Sevenson Checklist Number 010, "Task Specific Checklist – Sample Cooler Shipment" are included in Appendix 3. All

samples will be packaged and labeled for shipment in compliance with current regulations. All samples should be shipped to the project laboratory within 24 hours of sample collection via overnight courier service to ensure timely receipt of the samples by the laboratory. The shipment of samples on Friday is discouraged unless it is absolutely necessary and the laboratory has assured that personnel will be present to receive the shipment on Saturday and implement any necessary processing within the analytical holding times.

Samples should be prepared for shipment as follows:

- Samples will immediately be placed in a cooler filled with ice for temporary storage prior to shipment to the laboratory. Sample labels are placed on samples immediately after sample collection.
- Secure the lid of the sample jar tightly. Wrap the sample jar with bubble wrap. Place each sample jar in a separate ziplock-style plastic bag and seal.
- Only metal or plastic ice chests will be used for shipping samples. Tape shut any drain plugs on both the inside and outside of the cooler. Place a new, clean garbage bag inside the cooler as a secondary liner.
- Place bubble wrap or other suitable, waterproof packaging material between each sample bag to take up any void space in the cooler and to prevent the containers from touching. Place a temperature blank (i.e., a small bottle or jar filled with water) in close proximity to the sample containers.
- Ice used in coolers for shipping to the laboratories will be placed in doubled ziplock-style bags with a minimum amount of air. Use an adequate amount of ice bags such that the samples arrive at the laboratory at 4°C. Secure the secondary cooler liner with a twist-tie or knot.
- The COC record will be placed inside a ziplock-style bag and taped to the inside of the cooler top.
- The cooler will be closed and taped shut with packing tape or duct tape, and a custody seal will be properly placed across two sides of the cooler lid, preferably one on the front and one on the side.
- The shipping air bill will be securely attached to the exterior of the cooler. Commercial carriers or sample pickup couriers are not required to sign the COC record if it is sealed inside the shipping cooler and the custody seals remain intact. A copy of the bill of lading must be retained in the project files.

Laboratory Chain of Custody Procedures

The laboratory sample custodian will reconcile the information on the COC records with the sample bottles received and sign and date all appropriate receiving documents. The sample custodian will document any anomalies and report these to the laboratory project manager. Anomalies will be resolved with the project chemist. The CLP laboratory will send a copy of the sample receipt checklist to the USEPA's RSCC. The information will be entered in the Laboratory Information Management System (LIMS) along with the analyses being requested. The ensure traceability of samples while in possession of the laboratory, a method for sample identification that has been documented by the laboratory will be used to assign internal sample numbers. The sample custodian is responsible for seeing that all samples are transferred to the proper analyst or stored in the appropriate secure area. Laboratory personnel are responsible for the care and custody of samples from the time they are received, until the sample is exhausted or returned to the custodian using an internal COC record to track sample movement within the laboratory. When sample analyses and necessary QA checks have been completed in the laboratory, the unused portion of the sample will be disposed of properly. All identifying stickers, data sheets, and laboratory records are retained as part of the documentation. Sample containers and remaining samples are disposed of in compliance with federal, state, and local regulatory requirements.

Final Evidence Filed Custody Procedures

The evidence files for the project are maintained at the Sevenson office. The content of the evidence file will include all relevant records, reports, correspondence, logs, field logbooks, laboratory sample preparation and analysis logbooks, data packages, pictures, subcontractor reports, chain of custody

records, data review reports, etc. The evidence file will be under custody of the contractor project manager in a locked, secure area. The selected contract laboratory will also retain evidence files of analytical data for a minimum of seven years.

QAPP Worksheet #28-1
QC Samples Table

Matrix	Solid and Aqueous Waste Characterization
Analytical Group	TCLP Metals
Concentration Level	Unknown
Sampling SOP	FSP Sections 4.4, 4.5
Analytical Method/ SOP Reference	SW846 6010B/7470A or ILM05.4
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

NOTE: If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW ILM05.4.

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Calibration Blank	At the beginning and end of the analytical sequence and every 10 samples	All analytes must be ≤ the reporting limit (RL)	Recalibrate	Laboratory analyst	Representativeness	All analytes must be ≤ the RL
Preparation Blank	One per preparation batch of not more than 20 samples	All analytes must be ≤ the RL	Reprepare along with all associated samples	Laboratory analyst	Representativeness	All analytes must be ≤ the RL
Interference Check Sample	At the beginning and end of the analytical sequence and every 10 samples	Must meet the recovery limits of 20% of the true value	Recalibrate	Laboratory analyst	Bias	Must meet the recovery limits of 20% of the true value
Laboratory Control Sample (LCS)	One per preparation batch of not more than 20 samples	Must meet the method-specific control limit criteria	Re-prepare and reanalyze along with associated samples	Laboratory analyst	Accuracy/Bias	Must meet the method-specific control limit criteria
Serial Dilution	Per Sample Delivery Group (SDG)	Recovery should agree within 10% of original sample	Flag data	Laboratory analyst	Precision/Accuracy	Recovery should agree within 10% of original sample

QAPP Worksheet #28-2
QC Samples Table

Matrix	Solid and Aqueous Waste Characterization
Analytical Group	TCLP VOCs
Concentration Level	Unknown
Sampling SOP	FSP Sections 4.4, 4.5
Analytical Method/ SOP Reference	SW846 8260B or SOM01.2
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

NOTE: If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2.

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
ZHE Blank	One per batch of not more than 20 samples	All target compounds < RL	Reanalyze; if contaminated, find and eliminate source of contamination. Re-extract batch.	Laboratory analyst	Representativeness	All target compounds < RL
Method Blank	One per batch of not more than 20 samples	All target compounds < RL	Reanalyze	Laboratory analyst	Representativeness	All target compounds < RL
Surrogate Spike	Added to all samples and QC samples per the laboratory SOP	Must meet the method-specific control limit criteria	Reanalyze samples as necessary	Laboratory analyst	Accuracy	Must meet the method-specific control limit criteria
LCS	One per analytical batch of not more than 20 samples	Must meet the method-specific control limit criteria	Reanalyze	Laboratory analyst	Accuracy/Bias	Must meet the method-specific control limit criteria

QAPP Worksheet #28-3
QC Samples Table

Matrix	Solid and Aqueous Waste Characterization
Analytical Group	TCLP SVOCs
Concentration Level	Unknown
Sampling SOP	FSP Sections 4.4, 4.5
Analytical Method/ SOP Reference	SW846 8270C or SOM01.2
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

NOTE: If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2.

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
TCLP Blank	One per extraction batch not to exceed 20 samples	All target compounds < RL	If contaminated, find and eliminate the source and re-extract. If internal or system monitoring compounds fail acceptance criteria, reanalyze. Re-extract and analyze for continued failure.	Laboratory analyst	Representativeness	All target compounds < RL
Method Blank	One per extraction batch not to exceed 20 samples	All target compounds < RL	If contaminated, find and eliminate the source and re-extract. If internal or system monitoring compounds fail acceptance criteria, reanalyze. Re-extract and analyze for continued failure.	Laboratory analyst	Representativeness	All target compounds < RL
Surrogate Spike	Added to all samples and QC samples per the laboratory SOP	Must meet the method-specific control limit criteria	Reanalyze samples as necessary	Laboratory analyst	Accuracy	Must meet the method-specific control limit criteria
LCS	One per extraction batch not to exceed 20 samples	Must meet the method-specific control limit criteria	Reanalyze	Laboratory analyst	Accuracy/Bias	Must meet the method-specific control limit criteria

QAPP Worksheet #28-4
QC Samples Table

Matrix	Solid and Aqueous Waste Characterization
Analytical Group	TCLP Pesticides
Concentration Level	Unknown
Sampling SOP	FSP Sections 4.4, 4.5
Analytical Method/ SOP Reference	SW846 8081A or SOM01.2
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

NOTE: If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2.

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
TCLP Blank	One per extraction batch not to exceed 20 samples	All target compounds < RL	If contaminated, find and eliminate the source and re-extract. If internal or system monitoring compounds fail acceptance criteria, reanalyze. Re-extract and analyze for continued failure.	Laboratory analyst	Representativeness	All target compounds < RL
Method Blank	One per extraction batch not to exceed 20 samples	All target compounds < RL	If contaminated, find and eliminate the source and re-extract. If internal or system monitoring compounds fail acceptance criteria, reanalyze. Re-extract and analyze for continued failure.	Laboratory analyst	Representativeness	All target compounds < RL
Surrogate Spike	Added to all samples and QC samples per the laboratory SOP	Must meet the method-specific control limit criteria	Reanalyze samples as necessary	Laboratory analyst	Accuracy	Must meet the method-specific control limit criteria
LCS	One per extraction batch not to exceed 20 samples	Must meet the method-specific control limit criteria	Reanalyze	Laboratory analyst	Accuracy/Bias	Must meet the method-specific control limit criteria

QAPP Worksheet #28-5
QC Samples Table

Matrix	Solid and Aqueous Waste Characterization
Analytical Group	TCLP Herbicides
Concentration Level	Unknown
Sampling SOP	FSP Sections 4.4, 4.5
Analytical Method/ SOP Reference	SW846 8151A or SOM01.2
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

NOTE: If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2.

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
TCLP Blank	One per extraction batch not to exceed 20 samples	All target compounds < RL	If contaminated, find and eliminate the source and re-extract. If internal or system monitoring compounds fail acceptance criteria, reanalyze. Re-extract and analyze for continued failure.	Laboratory analyst	Representativeness	All target compounds < RL
Method Blank	One per extraction batch not to exceed 20 samples	All target compounds < RL	If contaminated, find and eliminate the source and re-extract. If internal or system monitoring compounds fail acceptance criteria, reanalyze. Re-extract and analyze for continued failure.	Laboratory analyst	Representativeness	All target compounds < RL
Surrogate Spike	Added to all samples and QC samples per the laboratory SOP	Must meet the method-specific control limit criteria	Reanalyze samples as necessary	Laboratory analyst	Accuracy	Must meet the method-specific control limit criteria
LCS	One per extraction batch not to exceed 20 samples	Must meet the method-specific control limit criteria	Reanalyze	Laboratory analyst	Accuracy/Bias	Must meet the method-specific control limit criteria

QAPP Worksheet #28-6
QC Samples Table

Matrix	Solid and Aqueous Waste Characterization
Analytical Group	Reactivity
Concentration Level	Unknown
Sampling SOP	FSP Sections 4.4, 4.5
Analytical Method/ SOP Reference	SW846 9014, 9034
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank	One per digestion batch not to exceed 20 samples	Absolute values of all analyte concentrations must be ≤ RL	Re-prepare and reanalyze along with associated samples	Laboratory analyst	Representativeness	Absolute values of all analyte concentrations must be ≤ RL
LCS	One per digestion batch not to exceed 20 samples	Must meet the method-specific control limit criteria	Re-prepare and reanalyze digestion batch	Laboratory analyst	Accuracy/Bias	Must meet the method-specific control limit criteria
Laboratory duplicate sample	One per SDG	Must meet the method-specific control limit criteria	Reanalyze	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria

QAPP Worksheet #28-7
QC Samples Table

Matrix	Solid and Aqueous Waste Characterization
Analytical Group	Corrosivity
Concentration Level	Unknown
Sampling SOP	FSP Sections 4.4, 4.5
Analytical Method/ SOP Reference	SW846 9045
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Calibration	One per batch of 20 samples	±0.10 pH unit of the temperature adjusted pH value	Recalibrate pH meter; reanalyze	Laboratory analyst	Accuracy	±0.10 pH unit of the temperature adjusted pH value
Laboratory duplicate sample	One per 10 samples	Must agree within ±0.10 pH units	Recalibrate pH meter; reanalyze	Laboratory analyst	Precision/Accuracy	Must agree within ±0.10 pH units

QAPP Worksheet #28-8
QC Samples Table

Matrix	Solid and Aqueous Waste Characterization
Analytical Group	Ignitability
Concentration Level	Unknown
Sampling SOP	FSP Sections 4.4, 4.5
Analytical Method/ SOP Reference	SW846 1010
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory duplicate sample	One per batch of 20 samples	Must agree within ±2°F	Re-prepare and reanalyze	Laboratory analyst	Accuracy	Must agree within ±2°F
LCS	One per batch of 20 samples	Must meet the method-specific control limit criteria	Re-prepare and reanalyze	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria

QAPP Worksheet #28-9
QC Samples Table

Matrix	Solid and Aqueous Waste Characterization and Soil (post-excavation confirmation, post-treatment, offsite backfill)
Analytical Group	PCBs
Concentration Level	Unknown
Sampling SOP	FSP Sections 4.2 through 4.8
Analytical Method/ SOP Reference	SW846 8082 or SOM01.2
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

NOTE: If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2.

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field duplicate	One per 10 field samples (not required for waste characterization sampling)	Should meet RPD criteria of 35%	Qualify data as necessary. Evaluate if the out of control condition is likely related to laboratory error. If so, no further action is needed. If laboratory error is not suspected or may not be completely responsible, notify the field team leader to evaluate field procedures	Sevenson Project Chemist	Precision/Accuracy	Should meet RPD criteria of 35%
Method Blank	One per extraction batch not to exceed 20 samples	All target compounds < ½ RL except common contaminants < RL	If contaminated find and eliminate the source. If internal or surrogate standard fail acceptance criteria, reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples.	Laboratory analyst	Representativeness	All target compounds < ½ RL except common contaminants < RL
Surrogate Spikes	Added to all samples and QC samples per the laboratory SOP	Must meet the method-specific control limit criteria	Reanalyze samples as necessary	Laboratory analyst	Accuracy	Must meet the method-specific control limit criteria

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS/LCSD	One per analytical batch	Must meet the method-specific control limit criteria	Correct and reanalyze samples as necessary	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria
MS/MSD	If requested, one per 20 field samples	Must meet the method-specific control limit criteria	No further action required; investigate if repeated failures occur	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria

QAPP Worksheet #28-10
QC Samples Table

Matrix	Soil (post-excavation confirmation, post-treatment, offsite backfill)
Analytical Group	VOCs
Concentration Level	Unknown
Sampling SOP	FSP Section 4.2, 4.3, 4.6, 4.7, 4.8
Analytical Method/ SOP Reference	SW846 8260B or SOM01.2
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

NOTE: If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2.

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field duplicate	One per 10 field samples	Should meet RPD criteria of 40%	Qualify data as necessary. Evaluate if the out of control condition is likely related to laboratory error. If so, no further action is needed. If laboratory error is not suspected or may not be completely responsible, notify the field team leader to evaluate field procedures	Sevenson Project Chemist	Precision/Accuracy	Should meet RPD criteria of 40%
Method Blank	One per 12 hour period in which samples are analyzed	All target compounds < ½ RL except common contaminants < RL	If contaminated, find and eliminate source of contamination. Reanalyze along with any associated samples.	Laboratory analyst	Representativeness	All target compounds < ½ RL except common contaminants < RL
Surrogate Spike	Added to all samples and QC samples per the laboratory SOP	Must meet the method-specific control limit criteria	Reanalyze samples as necessary	Laboratory analyst	Accuracy	Must meet the method-specific control limit criteria
LCS	One per analytical batch	Must meet the method-specific control limit criteria	Correct and reanalyze samples as necessary	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	If requested, one per 20 field samples	Must meet the method-specific control limit criteria	Verify a matrix effect. No further action required. Investigate if repeated failures occur.	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria

QAPP Worksheet #28-11
QC Samples Table

Matrix	Soil (post-excavation confirmation, post-treatment, offsite backfill)
Analytical Group	SVOCs
Concentration Level	Unknown
Sampling SOP	FSP Section 4.2, 4.3, 4.6, 4.7, 4.8
Analytical Method/ SOP Reference	SW846 8270C or SOM01.2
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

NOTE: If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2.

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field duplicate	One per 10 field samples	Should meet RPD criteria of 35%	Qualify data as necessary. Evaluate if the out of control condition is likely related to laboratory error. If so, no further action is needed. If laboratory error is not suspected or may not be completely responsible, notify the field team leader to evaluate field procedures	Sevenson Project Chemist	Precision/Accuracy	Should meet RPD criteria of 35%
Method Blank	One per extraction batch not to exceed 20 samples	All target compounds < ½ RL except common contaminants < RL	If contaminated, find and eliminate the source. If internal or surrogate standards fail acceptance criteria, reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples.	Laboratory analyst	Representativeness	All target compounds < ½ RL except common contaminants < RL
Surrogate Spike	Added to all samples and QC samples per the laboratory SOP	Must meet the method-specific control limit criteria	Reanalyze samples as necessary	Laboratory analyst	Accuracy	Must meet the method-specific control limit criteria

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per analytical batch	Must meet the method-specific control limit criteria	Correct and reanalyze samples as necessary	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria
MS/MSD	If requested, one per 20 field samples	Must meet the method-specific control limit criteria	No further action required. Investigate if repeated failures occur.	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria

QAPP Worksheet #28-12
QC Samples Table

Matrix	Soil (post-excavation confirmation, post-treatment, offsite backfill)
Analytical Group	Pesticides
Concentration Level	Unknown
Sampling SOP	FSP Section 4.2, 4.3, 4.6, 4.7, 4.8
Analytical Method/ SOP Reference	SW846 8081A or SOM01.2
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

NOTE: If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW SOM01.2.

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field duplicate	One per 10 field samples	Should meet RPD criteria of 35%	Qualify data as necessary. Evaluate if the out of control condition is likely related to laboratory error. If so, no further action is needed. If laboratory error is not suspected or may not be completely responsible, notify the field team leader to evaluate field procedures.	Sevenson Project Chemist	Precision/Accuracy	Should meet RPD criteria of 35%
Method Blank	One per extraction batch not to exceed 20 samples	All target compounds < ½ RL except common contaminants < RL	If contaminated, find and eliminate the source. If internal or surrogate standards fail acceptance criteria, reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples.	Laboratory analyst	Representativeness	All target compounds < ½ RL except common contaminants < RL
Surrogate Spike	Added to all samples and QC samples per the laboratory SOP	Must meet the method-specific control limit criteria	Reanalyze samples as necessary	Laboratory analyst	Accuracy	Must meet the method-specific control limit criteria

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per analytical batch	Must meet the method-specific control limit criteria	Correct and reanalyze samples as necessary	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria
MS/MSD	If requested, one per 20 field samples	Must meet the method-specific control limit criteria	No further action required. Investigate if repeated failures occur.	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria

QAPP Worksheet #28-13
QC Samples Table

Matrix	Soil (post-excavation confirmation, post-treatment)
Analytical Group	Dioxins/Furans
Concentration Level	Unknown
Sampling SOP	FSP Section 4.1, 4.2, 4.3, 4.6, 4.7, 4.8
Analytical Method/ SOP Reference	SW846 8290 or DLM02.0
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

NOTE: If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW DLM02.0

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field duplicate	One per 10 field samples	Should meet RPD criteria of 35%	Qualify data as necessary. Evaluate if the out of control condition is likely related to laboratory error. If so, no further action is needed. If laboratory error is not suspected or may not be completely responsible, notify the field team leader to evaluate field procedures.	Sevenson Project Chemist	Precision/Accuracy	Should meet RPD criteria of 35%
Method Blank	One per extraction batch not to exceed 20 samples	All target compounds < ½ RL except common contaminants < RL	If contaminated, find and eliminate the source. If internal or surrogate standards fail acceptance criteria, reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples.	Laboratory analyst	Representativeness	All target compounds < ½ RL except common contaminants < RL
Extraction standard	Added to all samples and QC samples per the laboratory SOP	Must meet the method-specific control limit criteria	Reanalyze samples as necessary	Laboratory analyst	Accuracy	Must meet the method-specific control limit criteria

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per analytical batch	Must meet the method-specific control limit criteria	Correct and reanalyze samples as necessary	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria
MS/MSD	If requested, one per 20 field samples	Must meet the method-specific control limit criteria	No further action required. Investigate if repeated failures occur.	Laboratory analyst	Precision/Accuracy	Must meet the method-specific control limit criteria

QAPP Worksheet #28-14
QC Samples Table

Matrix	Soil (post-excavation confirmation, post-treatment, offsite backfill)
Analytical Group	Metals and Cyanide
Concentration Level	Unknown
Sampling SOP	FSP Section 4.2, 4.3, 4.6, 4.7, 4.8
Analytical Method/ SOP Reference	SW846 6010B, 7471A, 9014 or ILM05.4
Sampler's Name	TBD
Field Sampling Organization	Sevenson
Analytical Organization	TBD
No. of Sample Locations	See Worksheet #18

NOTE: If samples are submitted to a USEPA CLP laboratory, the assigned laboratory must perform and meet all the measurement performance criteria specified in USEPA CLP SOW ILM05.4.

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	One per 10 field samples	Should meet RPD criteria of 40%	Qualify data as necessary. Evaluate if the out of control condition is likely related to laboratory error. If so, no further action is needed. If laboratory error is not suspected or may not be completely responsible, notify the field team leader to evaluate field procedures.	Sevenson Project Chemist	Precision/Accuracy	Should meet RPD criteria of 40%
Calibration blank	Following each initial and continuing calibration; every 2 hours or every 10 analytical samples, whichever is more frequent	Absolute values of all analyte concentrations must be < ½ RL	Stop analysis; correct problem; recalibrate	Laboratory analyst	Representativeness	Absolute values of all analyte concentrations must be < ½ RL
Preparation Blank	One per digestion batch	Absolute values of all analyte concentrations must be < ½ RL	Re-prepare and reanalyze except if concentration of analyte in all associated samples is >10x the concentration in the blank	Laboratory analyst	Representativeness	Absolute values of all analyte concentrations must be < ½ RL

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Interference Check Sample (ICS; not required for mercury or cyanide analysis)	The beginning of the analytical sequence	20% of the analyte's true value in the ICS solution	Check system. Correct problem. Recalibrate	Laboratory analyst	Accuracy/Bias	20% of the analyte's true value in the ICS solution
MS/MSD	One per preparatory batch	Must meet the method-specific control limit criteria	Analyze a post-digestion spike (POS) if recoveries fail and analyte concentration is <4x the spike added. POS not required for mercury or cyanide analysis)	Laboratory analyst	Accuracy/Bias	Must meet the method-specific control limit criteria
LCS	One per preparation batch	Must meet the method-specific control limit criteria	Re-prepare and reanalyze digestion batch	Laboratory analyst	Accuracy/Bias	Must meet the method-specific control limit criteria
Laboratory Duplicate	One per preparation batch	RPD of 20% if concentration is >5x RL or ± the RL is the concentration is <5x RL	Reanalyze once to verify results	Laboratory analyst	Precision/Accuracy	RPD of 20% if concentration is >5x RL or ± the RL is the concentration is <5x RL
Serial Dilution (not required for mercury or cyanide analysis)	One per preparation batch	Should agree within 10% of the original sample	Reanalyzed once to verify results	Laboratory analyst	Precision/Accuracy	Should agree within 10% of the original sample

QAPP Worksheet #29
Project Documents and Records

Sample Collection Documents and Records	On-Site Analysis Documents and Records	Off-Site Analysis Documents and Records	Data Assessment Documents and Records	Other
▪ Field logbooks ▪ Chain of custody records ▪ Air bills ▪ Custody seals ▪ Field Change Request forms ▪ Corrective Action forms ▪ Daily Chemical Quality Control Reports ▪ Photo logs	▪ Not applicable – no onsite analysis will be performed.	▪ Sample receipt, chain of custody forms, and sample tracking records ▪ Equipment calibration logs ▪ Sample preparation logs ▪ Case narrative, data packages ▪ Definition of laboratory qualifiers ▪ Equipment maintenance, testing, and inspection logs ▪ Corrective action forms ▪ Reported field sample results ▪ Electronic data deliverables ▪ Reported results with standards, QC checks, and QC samples ▪ Instrument printouts for field samples, standards, and QC samples ▪ Data package completeness checklists ▪ Technical/QA forms ▪ Data assessment reports ▪ Extraction/cleanup records ▪ Sample disposal records	▪ Field sampling audit checklists ▪ Offsite laboratory audit checklists ▪ Data review reports ▪ Corrective action forms ▪ Telephone logs	▪ Disposal facility waste approval forms ▪ Waste shipping manifests and/or bill-of-lading

QAPP Worksheet #30
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Locations/ID Number	Analytical SOP	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory / Organization (name and address, contact person and telephone number)
Waste characterization samples (solid and aqueous)	TCLP analytes (VOCs, SVOCs, pesticides, herbicides, metals), RCRA characteristics (corrosivity, ignitability, reactivity), PCBs	Unknown	Soil/debris not treatable with LTTD unit; wastewater storage tanks	SW846 8260B, 8270C, 8081A, 8151A, 8082 or USEPA CLP SOM01.2 SW846 6010B, 7471A or USEPA CLP ILM05.4 SW846 1010, 9045, 9014, 9035	10 days	USEPA CLP laboratory, DESA laboratory, or subcontracted laboratory as determined through FASTAC process.	A backup laboratory has not been assigned at this time.
Offsite backfill and topsoil	VOCs, SVOCs, pesticides, metals, cyanide, PCBs	Unknown	Offsite backfill and topsoil sources	SW846 8260B, 8270C, 8081A, 8151A, 8082 or USEPA CLP SOM01.2 SW846 6010B, 7471A, 9014 or USEPA CLP ILM05.4	10 days	USEPA CLP laboratory, DESA laboratory, or subcontracted laboratory as determined through FASTAC process.	A backup laboratory has not been assigned at this time.

Matrix	Analytical Group	Concentration Level	Sample Locations/ID Number	Analytical SOP	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory / Organization (name and address, contact person and telephone number)
Post-excavation confirmation samples	VOCs, SVOCs, pesticides, metals, cyanide, PCBs, dioxins/furans	Unknown	Excavation bottoms and sidewalls	SW846 8260B, 8270C, 8081A, 8151A, 8082 or USEPA CLP SOM01.2 SW846 6010B, 7471A, 9014 or USEPA CLP ILM05.4 SW846 8290 or USEPA CLP DLM02.0	48 hours	USEPA CLP laboratory, DESA laboratory, or subcontracted laboratory as determined through FASTAC process.	A backup laboratory has not been assigned at this time.
Post-LTTD treatment samples	VOCs, SVOCs, pesticides, metals, cyanide, PCBs, dioxins/furans	Unknown	Composite of daily LTDD output bins	SW846 8260B, 8270C, 8081A, 8151A, 8082 or USEPA CLP SOM01.2 SW846 6010B, 7471A, 9014 or USEPA CLP ILM05.4 SW846 8290 or USEPA CLP DLM02.0	24 hours	USEPA CLP laboratory, DESA laboratory, or subcontracted laboratory as determined through FASTAC process.	A backup laboratory has not been assigned at this time.

Matrix	Analytical Group	Concentration Level	Sample Locations/ID Number	Analytical SOP	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory / Organization (name and address, contact person and telephone number)
Pre-excavation soil samples – PDI Boring SB39	Dioxins/furans	Unknown	Proximate to PDI soil boring SB39	SW846 8290 or USEPA CLP DLM02.0	10 days	USEPA CLP laboratory, DESA laboratory, or subcontracted laboratory as determined through FASTAC process.	A backup laboratory has not been assigned at this time.
Pre-excavation soil samples – northern site boundary	VOCs, SVOCs, pesticides, metals, cyanide, PCBs, dioxins/furans	Unknown	To be determined in the field by the USACE Contracting Officer	SW846 8260B, 8270C, 8081A, 8151A, 8082 or USEPA CLP SOM01.2 SW846 6010B, 7471A, 9014 or USEPA CLP ILM05.4 SW846 8290 or USEPA CLP DLM02.0	10 days	USEPA CLP laboratory, DESA laboratory, or subcontracted laboratory as determined through FASTAC process.	A backup laboratory has not been assigned at this time.

Matrix	Analytical Group	Concentration Level	Sample Locations/ID Number	Analytical SOP	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory / Organization (name and address, contact person and telephone number)
LTTD treatment pad and soil stockpile/staging areas	VOCs, SVOCs, pesticides, metals, cyanide, PCBs, dioxins/furans	Unknown	LTTD treatment pad and soil stockpile/staging areas pre- and post-remediation activities	SW846 8260B, 8270C, 8081A, 8151A, 8082 or USEPA CLP SOM01.2 SW846 6010B, 7471A, 9014 or USEPA CLP ILM05.4 SW846 8290 or USEPA CLP DLM02.0	10 days	USEPA CLP laboratory, DESA laboratory, or subcontracted laboratory as determined through FASTAC process.	A backup laboratory has not been assigned at this time.

QAPP Worksheet #31
Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
Specific field procedure assessment and QAPP compliance	Initially within the first week and the at least quarterly if necessary	Internal	Sevenson self assessment	William Zambrana, Sevenson CQCSM	Sevenson Field Team Leader	Sevenson Field Team Leader	William Zambrana, Sevenson CQCSM Sevenson Field Team Leader
Data review	As data becomes available from the laboratory	Internal and External	Sevenson project chemist Laboratory QA Officer	Jennifer Singer, Sevenson Project Chemist Laboratory QA Officer	Jennifer Singer, Sevenson Project Chemist Laboratory QA Officer	Jennifer Singer, Sevenson Project Chemist Laboratory QA Officer	Jennifer Singer, Sevenson Project Chemist Laboratory QA Officer
Data review to assign regulatory status of materials for offsite disposal	As data becomes available from the laboratory	Internal	Sevenson regulatory specialist	Ken Paisley, Sevenson Regulatory Specialist/Waste Disposal Coordinator	Ken Paisley, Sevenson Regulatory Specialist/Waste Disposal Coordinator	Ken Paisley, Sevenson Regulatory Specialist/Waste Disposal Coordinator	Ken Paisley, Sevenson Regulatory Specialist/Waste Disposal Coordinator
Daily field documentation review	Daily	Internal	Sevenson self assessment	William Zambrana, Sevenson CQCSM	Sevenson Field Team Leader	Sevenson Field Team Leader	William Zambrana, Sevenson CQCSM Sevenson Field Team Leader

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
Health and safety audit	Initially within the first week of field work and then at least quarterly is necessary	Internal	Sevenson self assessment	Eric Tschudi, Sevenson SSHO	Kim Lickfield, Sevenson Project Manager	Sevenson Field Team Leader	Eric Tschudi, Sevenson SSHO

QAPP Worksheet #32
Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (name, title, organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (name, title, organization)	Timeframe for Response
Data validation	Laboratory resubmissions	Laboratory QA officer	After arrival of data from the *lab and during* data validation activities	Corrective action reports and/or updated *case narratives and* corrected data submissions	Jennifer Singer, Sevenson Project *Chemist*	7 business days
Daily field documentation reviews	Internal letter and any verification documentation	Kim Lickfield, Sevenson Project Manager	1 business day	Plan for correction and verification that correction is complete	Kim Lickfield, Sevenson Project Manager	1 business day
Internal project reporting reviews	Internal report comments	Kim Lickfield, Sevenson Project Manager	7 business days	Response to comment and applicable report correction	Kim Lickfield, Sevenson Project Manager	7 business days
Health and safety audit	Written audit report	Kim Lickfield, Sevenson Project Manager	3-5 business days	Letter and any verification documentation	Sevenson Field Team Leader	24 hours after notification

QAPP Worksheet #33
QA Management Reports Table

Type of Report	Frequency	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Daily Chemical Quality Control Report	Daily during field work	Duration of field activities	Sevenson Field Team Leader	Kim Lickfield, Sevenson Project Manager USACE
Field Audit Report	Initially within the first two weeks of field work and with follow-up audits if significant deficiencies are found	Month after field work begins	William Zambrana, Sevenson CQCSM	Kim Lickfield, Sevenson Project Manager
Corrective Action Report	When corrective action is required	When corrective action is implemented	William Zambrana, Sevenson CQCSM	Kim Lickfield, Sevenson Project Manager
Data Review Report	After lab data is received	Within 45 days after receiving data	Jennifer Singer, Sevenson Project Chemist	William Zambrana, Sevenson CQCSM Kim Lickfield, Sevenson Project Manager
Quality Control Summary Report	Quarterly	Quarterly	Jennifer Singer, Sevenson Project Chemist	USACE, USEPA
Health and Safety Audit	Once	Submitted with Final Reports	Eric Tschudi, Sevenson SSHO	USACE, USEPA

QAPP Worksheet #34
Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Chain of custody and shipping forms	COC forms and shipping documentation will be reviewed internally upon their completion and verified against the packed sample coolers they represent. The shipper's signature on the COC will be initialed by the reviewer, a copy of the COC retained in the site files, and the original and remaining copies taped inside the cooler for shipment. Refer to Section 5.3.2 of the FSP for additional details.	Internal	William Zambrana, Sevenson
Audit reports	Upon report completion, a copy of all audit reports will be placed in the site file. If corrective actions are required, a copy of the documented corrective action will be attached to the appropriate audit report in the site file. Copies of Sevenson's internal QC checklists, corrective action forms, and field change request forms are included in Appendix 3.	Internal	William Zambrana, Sevenson
Field notes	Field notes will be reviewed internally at the end of each working day and placed in the site file.	Internal	William Zambrana, Sevenson
Laboratory data	All laboratory packages ill be verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal. All data packages will be verified internally by the Sevenson project chemist or designee according to the data review procedures specified in Worksheet #36.	Internal/External	Laboratory QA Officer Jennifer Singer, Sevenson
FSP and QAPP	All planning documents will be available to reviewers to allow reconciliation with planned activities and objectives.	Internal	William Zambrana, Sevenson Jennifer Singer, Sevenson

QAPP Worksheet #35
Validation (Steps IIa and IIb) Process Table

Step IIa / IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	Laboratory data packages	Ensure that all analytical procedures were followed. Corrective actions will be taken and documented when applicable per specific methods. Data will be qualified in accordance with specific methods. Any deviations will be documented.	Laboratory personnel Jennifer Singer, Sevenson
IIa	Documentation of method QC results	Establish that all method required QC samples were run and met required limits.	Laboratory personnel Jennifer Singer, Sevenson
IIb	Documentation of QAPP QC sample results	Establish that all QAPP required QC samples were run and met required limits.	Laboratory personnel Jennifer Singer, Sevenson
IIb	Project quantitation limits	All sample results met the project quantitation limit specified in the QAPP.	Laboratory personnel Jennifer Singer, Sevenson
IIb	Sampling procedures	Evaluate whether sampling procedures were followed with respect to equipment and proper sampling support.	William Zambrana, Sevenson Jennifer Singer, Sevenson
IIb	Deviations (sampling and analysis)	Determine the impacts of any deviations from sampling or analytical methods and SOPs	William Zambrana, Sevenson Jennifer Singer, Sevenson USACE USEPA

QAPP Worksheet #36
Validation (Steps IIa and IIb) Summary Table

Step IIa / IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (Title and Organizational Affiliation)[1]
IIa/IIb	Soil	Metals, cyanide, VOCs, SVOCs, PCBs, pesticides, and/or dioxins/furans	Unknown	USEPA Region 2 Criteria	USEPA data validators or Sevenson
IIa/IIb	Solid and Liquid Waste Characterization	TCLP VOCs, SVOCs, pesticides, herbicides, and metals Total PCBs RCRA Characteristics (i.e., corrosivity, ignitability, reactivity)	Unknown	USEPA Region 2 Criteria	USEPA data validators or Sevenson

[1] All data generated through the USEPA CLP laboratory or DESA are considered USEPA-validated and are usable as reported. Commercial subcontracted laboratory data will be validated by Sevenson.

QAPP Worksheet #37
Usability Assessment

Summarize the usability assessment and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:

It is the responsibility of the Sevenson Project Chemist and the laboratory to ensure that the data meet the method detection limits, reporting limits, and laboratory QC limits listed in the QAPP. During the data validation assessment, non-conformances are documented and data are qualified for use in decision making. The data are determined to be usable by the Project Chemist based on the requirements of this QAPP. Data gaps will be present if a sample is not collected, a sample is not analyzed for the requested parameters, or the data are determined to be unusable. The need for further investigation will be determined on a case-by-case basis, depending on whether data can be extrapolated from adjacent sampling locations, and whether or not the results are unnecessary based on the results from adjacent locations. All data are usable as qualified by the data validator, with the exception of rejected data. Estimated and/or biased results are usable.

Describe the evaluative procedures used to assess overall measurement error associated with the project:

In depth assessment occurs during the data validation process. The validation will follow approved USEPA Region 2 Guidelines and SOPs to assess conformance with the requirements of the methods, SOPs, and objectives of this QAPP. The findings of the data validation will generate qualifiers applied to the data considered in context to assess overall usability of the data.

Identify the personnel responsible for performing the usability assessment:

Jennifer Singer, Sevenson Project Chemist

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

The data validation reports will identify precision and accuracy exceedances with respect to the laboratory performance for each batch of samples, as well as comparability of field and laboratory duplicates. All the results will be assembled and reported for an overall quality assessment provided in the Quality Control Summary Report and final project report. Discussion will cover precision, accuracy/bias, sensitivity, representativeness, comparability, completeness, and reconciliation, defined as follows.

Precision. Results of laboratory duplicates will be assessed during data review and data will be qualified according to the data review procedures cited on Worksheet #36. Field duplicate samples will not be collected due to the limited nature of the sampling (i.e., waste characterization purposes). A discussion summarizing the results of laboratory precision and any limitations on the use of the data will be described in the Quality Control Summary Report.

Accuracy/Bias Contamination. Results of laboratory blanks will be assessed as part of data review. During the review process the reviewer will qualify the data following the procedures described on Worksheet #36. A discussion summarizing the results of laboratory accuracy and bias based on contamination will be presented and any limitation on the use of the data will be described in the Quality Control Summary Report.

Overall Accuracy/Bias. The results of matrix spike recoveries will be reviewed and data will be qualified according to the data review procedures cited on Worksheet #36. A discussion summarizing the results of laboratory accuracy and any limitations on the use of the data will be described in the Quality Control Summary Report.

Sensitivity. Data results will be compared to clean-up criteria provided on Worksheet #15. A discussion summarizing any conclusions about the sensitivity of the analyses will be presented and any limitations on the use of the data will be described in the Quality Control Summary Report.

Representativeness. A review of adherence to field procedures and of project quality control audits will be performed in order to assess the representativeness of the sampling program. Data review narratives will also be reviewed and any conclusions about the representativeness of the data set will be discussed.

Comparability. Data will be collected, analyzed, and reported in a manner that is comparable to the existing site data.

Completeness. A completeness check will be done on all data generated by the laboratory. Completeness will be calculated for each analyte as follows. For sampling, completeness will be calculated as the number of samples collected and analyzed by the laboratory divided by the number planned for collection. Also for each analyte, completeness will be calculated as the number of data points for each analyte that meets measurement performance criteria divided by the total number of data points for that analyte. A discussion summarizing the results of project completeness and any limitations on the use of the data will be described in the Quality Control Summary Report.

Reconciliation. The project quality objectives presented in Worksheet #12 will be examined to determine if the objective was met. This examination will include a combined overall assessment of the results of each analysis pertinent to an objective. Each analysis will first be evaluated separately in terms of major impacts observed from data review, data quality indicators, and measurement performance criteria assessments. Based on the results of these assessments, the quality of the data will be determined. Based on the quality determined, the usability of the data for each analysis will be determined. Based on the combined usability of the data from all analyses for an objective, it will be determined if the project quality objective was met and whether project goals were achieved. As part of the reconciliation of each objective, conclusions will be drawn and any limitations on the usability of any of the data will be described.

FIELD SAMPLING PLAN – REVISION 0

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
OPERABLE UNIT 2 – SOIL REMEDIATION
SOUTH PLAINFIELD, NEW JERSEY

CONTRACT # W912DQ-04-D-0023
DELIVERY ORDER #0005

Prepared By:

SEVENSON ENVIRONMENTAL SERVICES, INC.
2749 Lockport Road
Niagara Falls, NY 14305

OCTOBER 2008

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
OPERABLE UNIT 2 – SOIL REMEDIATION
SOUTH PLAINFIELD, NEW JERSEY

FIELD SAMPLING PLAN

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LIST OF ABBREVIATIONS AND ACRONYMS

COC	Chain-of-Custody
CQC	Contractor Quality Control
CQCSM	Contactor Quality Control Systems Manager
DCQCR	Daily Chemical Quality Control Report
DQO	Data Quality Objective
FSP	Field Sampling Plan
Ft^2	Square Feet
IDW	Investigation Derived Waste
IGWSCC	Impact to Groundwater Soil Cleanup Criteria
LTTD	Low Temperature Thermal Desorption
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NCR	Non-Conformance Report
NJDEP	New Jersey Department of Environmental Protection
OU-2	Operable Unit 2
PCB	Polychlorinated Biphenyl
PDI	Pre-Design Investigation
ppm	Parts per Million
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCSR	Quality Control Summary Report
ROD	Record of Decision
Sevenson	Sevenson Environmental Services, Inc.
SSHERP	Site Safety, Health, and Emergency Response Plan
SVOC	Semi-Volatile Organic Compound
TCLP	Toxicity Characteristic Leachate Procedure
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
Yd^3	Cubic Yards

1.0 PROJECT DESCRIPTION

1.1 Project Background

The Cornell-Dubilier Electronics Superfund Site (the site) is located at 333 Hamilton Boulevard in South Plainfield, Middlesex County, New Jersey. A site location map is included in Appendix 1. The United States Environmental Protection Agency (USEPA) assigned identification number NJD981557879 to the site.

The site consists of approximately 26 acres including the Hamilton Industrial Park, contaminated portions of the Bound Brook adjacent to and downstream of the industrial park, and contaminated residential, municipal, and commercial properties in the vicinity of the former Cornell-Dubilier Electronics Corporation, Inc. facility. Former buildings on the site have been demolished and their footprints covered with temporary asphalt pavement. The only remaining building at the site is a water tower, which is to be protected during the performance of the work. The site is bounded by the Lehigh Valley Railroad to the northeast, Factory Street to the southeast, Spicer Avenue to the southwest, and by Hamilton Boulevard. The area is a busy, heavily developed, mixed-use neighborhood.

The developed portion of the facility (i.e., the northwest portion) comprises approximately 45 percent of the total land area which formerly contained buildings, a system of catch basins to channel storm water flow, and paved roadways. Several of the catch basins drain into a storm water collection systems whose outfalls discharge at various locations along Bound Brook. The other 55 percent of the property is predominantly vegetated. The central part of the undeveloped portion is primarily an open field, with some wooded areas to the northeast and south, and a deteriorated, partially paved area in the middle. The northeast and southeast boundaries consist primarily of wetland areas adjacent to Bound Brook, which flows from the eastern corner across the northeastern border of the undeveloped portion of the facility.

The site remediation was separated into multiple Operable Units. The scope of the current remedial action is Operable Unit 2 (OU-2), specifically remediation of contaminated site soils. The response action selected in the Record of Decision (ROD) dated September 2004 for OU-2 soils includes:

- Excavation of an estimated 107,000 cubic yards (yd^3) of contaminated soil containing polychlorinated biphenyls (PCBs) at concentrations greater than 500 parts per million (ppm) and contaminated soils

that exceed New Jersey's Impact to Groundwater Soil Cleanup Criteria (IGWSCC) for contaminants other than PCBs. A map showing the approximate limits of contamination is included in Appendix 1.

- Onsite treatment of excavated soils amendable to treatment by low temperature thermal desorption (LTTD), followed by backfilling of excavated areas with treated soils.
- Transportation of contaminated soil and debris not suitable for LTTD treatment to an offsite facility for disposal, with treatment as necessary.
- Installation of a multi-layer cap or hardscape.
- Installation of engineering controls.
- Property restoration.
- Implementation of institutional controls.

The purpose of this Field Sampling Plan (FSP) is to provide procedures for the collection, analysis, and evaluation of data for the OU-2 soils in accordance with the response action selected in the ROD.

1.2 Site History and Contaminants

Cornell-Dubilier Electronics manufactured electronic parts and components, including capacitors, from 1936 to 1962. PCBs and chlorinated organic degreasing solvents were used in the manufacturing process. It is alleged that during the period of operation, Cornell-Dubilier Electronics dumped PCB-contaminated materials and other hazardous substances directly onto site soils. A former employee has claimed that the rear of the property was saturated with transformer oils and that capacitors were also buried behind the facility during the same time period (Foster Wheeler, 2002). Based on historic site practices, portions of the site have the potential to be contaminated with volatile organic compounds (VOCs; primarily trichloroethene and dechlorination products), PCBs, dioxins, metals (primarily mercury and lead), and other constituents of potential concern.

1.3 Site Specific Definition of the Problem

Work is being conducted at the Cornell-Dubilier Electronics Superfund Site due to contamination found in soil associated with past industrial operations conducted at the site. Sevenson will be responsible for removal of contaminated soil based upon the predetermined limits of exacavation; treatment of excavated soils amenable to LTTD; backfilling of excavations with either LTTD treated soils or offsite materials; transportation of all

soil and debris which cannot be treated onsite to an offsite disposal facility; site restoration and implementation of appropriate site controls; and other activities necessary for complete and proper remediation of the site.

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2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project will be staffed by Sevenson Environmental Services, Inc. (Sevenson). Project personnel were selected on the basis of appropriate skills, experience, and availability. The Sevenson organizational structure for this project and project personnel responsibilities are shown on Worksheet #5 of the Quality Assurance Project Plan (QAPP).

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3.0 SCOPE AND OBJECTIVES

3.1 Task Description

This FSP presents the technical approach for conducting data collected to support the remediation of Cornell-Dubilier OU-2 site soils. This document addresses the following sampling programs:

- Solid and liquid waste characterization sampling.
- Offsite backfill and topsoil sampling.
- Post-excavation confirmation sampling.
- Post-LTTD treatment sampling.
- Pre-excavation soil sampling proximate to Pre-Design Investigation (PDI) soil boring number SB39.
- Pre-excavation soil sampling from the northern site boundary.
- Pre- and post-remediation sampling of the LTTD treatment pad and soil stockpile/staging areas.

3.2 Applicable Regulations/Standards

This FSP was developed to address environmental/chemical contamination necessary for the remediation of site soils. The collection of environmental/chemical contaminant data supports the Data Quality Objectives (DQOs) provided in Appendix 2, which were developed in accordance with the remedial action objectives of the ROD.

Task-specific project action limits are included in Worksheets #15-1 through #15-18 of the QAPP.

3.3 Project Schedule

The implementation of this FSP will be conducted in accordance with the master project schedule as maintained by the United States Army Corps of Engineers (USACE) and Sevenson Project Managers.

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4.0 FIELD ACTIVITIES

Field sampling activities in support of site remediation are presented in this section. The types of samples to be collected include: pre-excavation soil samples from select locations, solid waste disposal characterization samples, wastewater disposal characterization samples, post-excavation confirmation soil samples, post-LTTD treatment samples, and offsite source backfill and topsoil samples. Specified sample collection and identification procedures, quality assurance/quality control (QA/QC) requirements, and standard procedures necessary for obtaining data of acceptable quality are also presented in this and subsequent sections of the FSP. Qualified personnel experienced in the type of sampling being performed will conduct all sampling. Sampling personnel will adhere to health and safety requirements provided in the Site Safety, Health, and Emergency Response Plan (SSHERP). The following sections detail the methods of collection for each of the sampling matrixes listed above.

4.1 Pre-Excavation Soil Sampling – PDI Boring SB39

Prior to intrusive remediation activities, four samples will be collected proximate to PDI soil boring number SB39. The samples will be analyzed for dioxins/furans as summarized in Table 4-1. The samples will be collected from each corner of a 10-foot by 10-foot square established around the SB39 boring, with the existing boring point at its center. Samples will be collected to a depth of 4-feet below ground surface. It is anticipated that soil samples will be collected from each location using an auger or other soil coring device following the procedures included in the New Jersey Department of Environmental Protection (NJDEP) *Field Sampling Procedures Manual* (NJDEP, 2005). The samples will be collected as follows:

- Gloves will be donned immediately prior to sampling and a clean pair of new disposable gloves will be worn each time a different location is sampled.
- Remove unnecessary rocks, twigs, and other non-soil materials from selected sampling point.
- Begin turning the auger with a clockwise motion and continue until the desired sampling depth is obtained.
- Use a second auger to collect the sample. Discard one-half inch of material in the top portion of the auger due to cave-in.
- Place the sample into a clean decontaminated container to be homogenized. Samples will be homogenized by physically mixing the soil by gloved hand. At no time will a bare hand come into contact with the sample.

- Transfer the sample into laboratory cleaned sample jars using a clean decontaminated stainless steel spoon or trowel.

Table 4-1: Sampling and Analysis Matrix

Sample	Location	Rationale	Parameter(s)	Sample Type	Type of Bottles[1,2]	Number of Bottles[1,2]	Methodology	Holding Time[3]	Preservative
Pre-Excavation Soil Samples	Proximate to PDI soil boring SB39	Further characterize the soil proximate to PDI soil boring number SB39	Dioxins/Furans	Grab	4oz. AG	1	SW846-8290 or USEPA CLP DLM02.0	30 days to extraction; 45 days to analysis	Cool 4°C
Pre-Excavation Soil Samples	Northern site boundary	Delineate site-related contaminants that are identified along the Conrail property located along the northern site boundary	VOCs	Grab	EnCore™ sampler	2	SW-846 5035/8260B or USEPA CLP SOM01.2	48 hours to preservation by laboratory; 14 days to analysis	Cool 4°C
			TCL SVOCs	Grab	32oz. CWM	2	SW-846 3550C/8270C or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			TCL Pesticides	Grab			SW-846 3550C/8081A or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			Total PCBs	Grab			SW-846 3550C/8082 or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			Cyanide	Grab			SW-846 Method 9014 or USEPA CLP ILM05.4	14 days	Cool 4°C
			TAL Metals	Grab			SW-846 3050/6010B/7471A or USEPA CLP ILM05.4	180 days to digestion; 180 days to analysis (Hg 28 days)	Cool 4°C
			Dioxins/Furans	Grab	4oz. AG	1	SW846-8290 or USEPA CLP DLM02.0	30 days to extraction; 45 days to analysis	Cool 4°C
LTTD Treatment Pad and Soil Stockpile/Staging Area Samples	LTTD treatment pad and soil stockpile/staging area pre- and post-remediation	Assess is cross-contamination occurred beneath the LTTD treatment pad and stockpile/staging areas during remedial activities	VOCs	Grab	EnCore™ sampler	2	SW-846 5035/8260B or USEPA CLP SOM01.2	48 hours to preservation by laboratory; 14 days to analysis	Cool 4°C
			TCL SVOCs	Grab	32oz. CWM	2	SW-846 3550C/8270C or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			TCL Pesticides	Grab			SW-846 3550C/8081A or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			Total PCBs	Grab			SW-846 3550C/8082 or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			Cyanide	Grab			SW-846 Method 9014 or USEPA CLP ILM05.4	14 days	Cool 4°C
			TAL Metals	Grab			SW-846 3050/6010B/7471A or USEPA CLP ILM05.4	180 days to digestion; 180 days to analysis (Hg 28 days)	Cool 4°C

Table 4-1: Sampling and Analysis Matrix

Sample	Location	Rationale	Parameter(s)	Sample Type	Type of Bottles[2]	Number of Bottles[2]	Methodology	Holding Time[3]	Preservative
			Dioxins/Furans	Grab	4oz. AG	1	SW846-8290 or USEPA CLP DLM02.0	30 days to extraction; 45 days to analysis	Cool 4°C
Solid Waste Characterization	Stockpiles and disposal bins	Meet federal, state, and local regulations in accordance with the requirements of the disposal facility	Ignitability	Composite	32oz. CWM	1	SW-846 1010	7 days	Cool 4°C
			Corrosivity				SW-846 9045C	14 days	
			Reactive Cyanide				SW-846 Section 7.4.3.2/ Method 9014	14 days	
			Reactive Sulfide				SW-846 Section 7.4.4.2/ Method 9034	7 days	
			TCLP Metals				SW-846 1311/3015/6010B/ 7470A or USEPA CLP ILM05.4	180 days to TCLP extraction (Hg 28 days) 180 days to analysis (Hg 28 days)	
			TCLP SVOCs				SW-846 1311/3510C/8270C or USEPA CLP SOM01.2	14 days to TCLP extraction 7 days to preparative extraction 40 days to analysis	
			TCLP Pesticides				SW-846 1311/3510C/8081A or USEPA CLP SOM01.2	14 days to TCLP extraction 7 days to preparative extraction 40 days to analysis	
			TCLP Herbicides				SW-846 1311/3510C/8151A or USEPA CLP SOM01.2	14 days to TCLP extraction 7 days to preparative extraction 40 days to analysis	
			Total PCBs	Composite	4 oz. CWM	1	SW-846 3550C/8082 or USEPA CLP SOM01.2	14 days to extraction 40 days to analysis	Cool 4°C
			TCLP VOCs	Grab	4 oz. CWM	2	SW-846 1311/5030B/8260B or USEPA CLP SOM01.2	14 days to TCLP extraction 14 days to analysis	Cool 4°C
Wastewater[4]	Storage tank	Meet federal, state, and local regulations in accordance with the requirements of the disposal facility	Ignitability	Composite	1L AG	3	SW-846 1010	7 days	Cool 4°C
			Corrosivity				SW-846 9040C	Immediately	
			Reactive Cyanide				SW-846 Section 7.4.3.2/ Method 9014	14 days	
			Reactive Sulfide				SW-846 Section 7.4.4.2/ Method 9034	7 days	
			TCLP Metals				SW-846 1311/3015/6010B/ 7470A or USEPA CLP ILM05.4	180 days to TCLP extraction (Hg 28 days) 180 days to analysis (Hg 28 days)	

Table 4-1: Sampling and Analysis Matrix

Sample	Location	Rationale	Parameter(s)	Sample Type	Type of Bottles[1,2]	Number of Bottles[1,2]	Methodology	Holding Time	Preservative
			TCLP SVOCs				SW-846 1311/3510C/8270C or USEPA CLP SOM01.2	14 days to TCLP extraction 7 days to preparative extraction 40 days to analysis	
			TCLP Pesticides				SW-846 1311/3510C/8081A or USEPA CLP SOM01.2	14 days to TCLP extraction 7 days to preparative extraction 40 days to analysis	
			TCLP Herbicides				SW-846 1311/3510C/8151A or USEPA CLP SOM01.2	14 days to TCLP extraction 7 days to preparative extraction 40 days to analysis	
			TCLP VOCs	Grab	40 mL G vial w/Teflon septa	4	SW-846 1311/5030C/8260B or USEPA CLP SOM01.2	14 days to TCLP extraction 14 days to analysis	Cool 4°C
			Total PCBs	Grab	1L AG	2	SW-846 8082 or USEPA CLP SOM01.2	7 days to extraction 40 days to analysis	Cool 4°C
Post-Excavation Confirmation Soil Samples	Excavation area bottom and sidewalls	Confirm that contaminated soil has been removed	VOCs	Grab	EnCore™ sampler	2	SW-846 5035/8260B or USEPA CLP SOM01.2	48 hours to preservation by laboratory; 14 days to analysis	Cool 4°C
			TCL SVOCs	Grab	32oz. CWM	2	SW-846 3550C/8270C or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			TCL Pesticides	Grab			SW-846 3550C/8081A or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			Total PCBs	Grab			SW-846 3550C/8082 or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			Cyanide	Grab			SW-846 Method 9014 or USEPA CLP ILM05.4	14 days	Cool 4°C
			TAL Metals	Grab			SW-846 3050/6010B/7471A or USEPA CLP ILM05.4	180 days to digestion; 180 days to analysis (Hg 28 days)	Cool 4°C
			Dioxins/Furans	Grab	4oz. AG	1	SW846-8290 or USEPA CLP DLM02.0	30 days to extraction; 45 days to analysis	Cool 4°C
Post-LTTD Treatment Samples	LTTD-treatment pad stockpiles or bins	Confirm that soil treated in the onsite LTTD unit has been treated adequately to be used as onsite backfill	VOCs	Grab	EnCore™ sampler	2	SW-846 5035/8260B or USEPA CLP SOM01.2	48 hours to preservation by laboratory; 14 days to analysis	Cool 4°C

Table 4-1: Sampling and Analysis Matrix

Sample	Location	Rationale	Parameter(s)	Sample Type	Type of Bottles[1,2]	Number of Bottles[1,2]	Methodology	Holding Time[3]	Preservative
			TCL SVOCs	Grab	32oz. CWM	2	SW-846 3550C/8270C or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			TCL Pesticides	Grab			SW-846 3550C/8081A or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			Total PCBs	Grab			SW-846 3550C/8082 or USEPA CLP SOM01.2	14 days to extraction; 40 days to analysis	Cool 4°C
			Cyanide	Grab			SW-846 Method 9014 or USEPA CLP ILM05.4	14 days	Cool 4°C
			TAL Metals	Grab			SW-846 3050/6010B/7471A or USEPA CLP ILM05.4	180 days to digestion; 180 days to analysis (Hg 28 days)	Cool 4°C
			Dioxins/Furans	Grab	4oz. AG	1	SW846-8290 or USEPA CLP DLM02.0	30 days to extraction; 45 days to analysis	Cool 4°C
Backfill/ Topsoil	Off-Site Borrow Source(s)	Establish that backfill and topsoil material brought on-Site for restoration activities are not hazardous to human health or the environment	VOCs	Grab	EnCore™ sampler	2	SW-846 5035/8260B	48 hours to preservation by laboratory 14 days to analysis	Cool 4°C
			TCL SVOCs	Composite	32oz. CWM	2	SW-846 3550C/8270C	14 days to extraction 40 days to analysis	Cool 4°C
			TCL Pesticides	Composite			SW-846 3550C/8081A	14 days to extraction 40 days to analysis	Cool 4°C
			Total PCBs	Composite			SW-846 3550C/8082	14 days to extraction 40 days to analysis	Cool 4°C
			Cyanide	Composite			SW-846 Section 7.4.3.2/ Method 9014	14 days	Cool 4°C
			TAL Metals	Composite			SW-846 3050/6010B/7471A	180 days to digestion 180 days to analysis (Hg 28 days)	Cool 4°C

Notes:
[1] Bottle types – AG: Amber Glass; HDPE: High Density Polyethylene Plastic; CWM: Clear wide mouth glass jar with Teflon lid
[2] All bottles should be filled completely with zero head space
[3] From Verified Time of Sample Collection
[4] For TCLP analysis on aqueous samples, the laboratory will filter the sample and the aqueous filtrate becomes the TCLP extract. If the aqueous sample contains visible solids, then a percent dry solids determination is performed. If the percent dry solids is >0.5% (about 50g of solids in 1L of aqueous sample), a TCLP extraction will be performed if there is at least 130g of solids present. The aqueous filtrate and TCLP extract are combined for analysis.

4.2 Pre-Excavation Soil Sampling – Northern Site Boundary

In order to delineate the contamination along the northern site boundary adjacent to the Conrail railroad tracks, pre-excavation soil samples will be collected from the Conrail property. Prior to collecting these

samples, the USEPA will obtain an access agreement with Conrail. The samples will be analyzed for metals, cyanide, VOCs, semi-volatile organic compounds (SVOCs), pesticides, PCBs, and dioxins/furans as summarized in Table 4-1. The samples will be collected at the direction of the USACE Contracting Officer. It is anticipated that soil samples will be collected from each selected location using an auger or other soil coring device following the procedures included in the NJDEP *Field Sampling Procedures Manual* (NJDEP, 2005). The samples will be collected as follows:

- Gloves will be donned immediately prior to sampling and a clean pair of new disposable gloves will be worn each time a different location is sampled.
- Remove unnecessary rocks, twigs, and other non-soil materials from selected sampling point.
- Begin turning the auger with a clockwise motion and continue until the desired sampling depth is obtained.
- Use a second auger to collect the sample. Discard one-half inch of material in the top portion of the auger due to cave-in.
- Place the sample for VOC analysis directly into the EnCore™ sampler by inserting the coring tool into the soil, taking care not to trap air behind the sample. Wipe the exterior of the barrel to ensure a tight seal. Snap the cap in the open end.
- Place the remaining sample material into a clean decontaminated container to be homogenized. Samples will be homogenized by physically mixing the soil by gloved hand. At no time will a bare hand come into contact with the sample.
- Transfer the sample into laboratory cleaned sample jars using a clean decontaminated stainless steel spoon or trowel.

4.3 LTTD Treatment Pad and Soil Stockpile/Staging Area Sampling

Pre- and post-remedial action testing will be performed at the location of the LTTD treatment pad and surrounding the soil stockpile/staging locations in order to assess if cross-contamination occurred during remedial activities. The samples will be analyzed for metals, cyanide, VOCs, SVOCs, pesticides, PCBs, and dioxins/furans as summarized in Table 4-1. Five samples will be collected at regular spacing, from a depth interval of zero to six inches below grade as approved by the USACE Contracting Officer. It is anticipated that soil samples will be collected from each selected location using a clean decontaminated stainless steel trowel following the procedures included in the NJDEP *Field Sampling Procedures Manual* (NJDEP, 2005). The samples will be collected as follows:

- Gloves will be donned immediately prior to sampling and a clean pair of new disposable gloves will be worn each time a different location is sampled.
- At specified intervals, take small, equal portions of sample from the surface and immediately below the surface with a clean decontaminated stainless steel trowel.
- Place the sample for VOC analysis directly into the EnCore™ sampler by inserting the coring tool into the soil, taking care not to trap air behind the sample. Wipe the exterior of the barrel to ensure a tight seal. Snap the cap in the open end.
- Place the remaining sample material into a clean decontaminated container to be homogenized. Samples will be homogenized by physically mixing the soil by gloved hand. At no time will a bare hand come into contact with the sample.
- Transfer samples into laboratory cleaned sample jars.

4.4 Solid Waste Characterization Sampling

Waste characterization samples will be collected from excavated soil and debris which are determined to not be suitable for treatment in the onsite LTTD unit for waste characterization and disposal facility approval. The waste characterization samples will be analyzed for corrosivity, ignitability, hydrogen cyanide reactivity, hydrogen sulfide reactivity, toxicity characteristic leachate procedure (TCLP) VOCs, TCLP SVOCs, TCLP pesticides, TCLP herbicides, TCLP metals, and total PCBs as summarized in Table 4-1. The sample results and the completed waste profile will be sent to the offsite disposal facility for waste shipment approval.

Grab samples will be collected for the VOCs and composite samples will be collected for other analytes. The compositing procedure is designed to provide a representative sample of the waste material by combining three discrete samples from within the debris stockpile or disposal bin (e.g., roll-off container). These discrete samples will be spread evenly so that they are spatially representative of the waste materials both horizontally and vertically (i.e., one each at shallow, medium, and deep depths along the length of the container or stockpile). For the VOC sample, one of the three discrete locations will be selected at random and sampled.

Prior to sampling, a visual inspection of the waste materials will be performed to located areas suitable for sampling. If necessary based on the size of the materials, a hand-held hammer or similar chipping device will be utilized to break down the materials prior to sample collection. Once the sampling locations have been determined, the following procedure will be followed for each sampling depth:

- Gloves will be donned immediately prior to sampling and a clean pair of new disposable gloves will be worn each time a different location is sampled.
- Using a clean decontaminated hand auger or sampling trowel, collect sufficient sample from three discrete sample locations into a clean decontaminated container.
- For the sampling location selected for VOC analysis, the last part of the sample collected should be placed directly into the appropriate laboratory cleaned sample jars. The jar should contain as little headspace as possible.
- The remaining sample in the container should be homogenized by physically mixing the soil by gloved hand. At no time will a bare hand come into contact with the sample.
- Transfer samples into laboratory cleaned sample jars.
- Leftover sample material will be placed back into the stockpile or disposal bin.

4.5 Wastewater Characterization Sampling

Wastewaters generated during Site activities will include decontamination water and storm water which may accumulate in the remediation areas. Liquid wastes will be containerized in an aboveground storage tank. Aqueous samples will be collected to determine the waste management approach. The goal of sampling the wastewaters will be to meet Federal, state, and local regulations in accordance with the requirements of the disposal facility. The waste characterization samples will be analyzed for corrosivity, ignitability, hydrogen cyanide reactivity, hydrogen sulfide reactivity, TCLP VOCs, TCLP SVOCs, TCLP pesticides, TCLP herbicides, TCLP metals, and total PCBs as summarized in Table 4-1. The sample results and the completed waste profile will be sent to the offsite disposal facility for waste shipment approval.

Samples will be collected using dedicated, disposable polyvinyl chloride or Teflon bailers. The following sample procedure is consistent with NJDEP sampling instructions (NJDEP, 2005):

- Prepare the work area by placing plastic sheeting on the ground to avoid cross-contamination.
- Attach a bailer to cable or line for lowering. Polyethylene or nylon rope is recommended.
- Lower the bailer slowly until it contacts the water surface.
- Allow the bailer to sink and fill.
- Slowly raise the bailer to the surface. Do not allow the bailer line or bailer to contact the ground surface.

- Fill sample bottles by tipping bailer to allow slow discharge from the top to flow gently down the side of the sample bottle with minimum turbulence. If a bottom drain is present on the bailer, achieve a slow steady flow.
- Repeat as necessary to acquire sufficient volume to fill all sample containers.

4.6 Post-Excavation Soil Sampling

Soil samples will be collected at the site in order to provide the data necessary to establish that soil with concentrations greater than the project action levels have been removed from the excavation prior to site restoration. Samples will be collected from the floor and sidewalls of the excavation. Samples will be analyzed for metals and cyanide, VOCs, SVOCs, pesticides, PCBs, and dioxins/furans as summarized in Table 4-1.

Grid floor verification soil samples will be collected at the bottom center of each 30-foot grid (i.e., one sample every 900 square feet (ft^2)). Sidewall verification samples will be collected from the horizontal and vertical midpoint of the sidewall every 30-feet of the excavation. A map showing the approximate limits of excavation and sample grids is included in Appendix 1. If a grid verification sample exceeds the cleanup criteria, additional soil will be removed and the grid bottom and sidewalls will be tested again. This process will repeated until grid verification sample results less than the cleanup criteria are detected.

It is anticipated that soil samples will be collected from each selected location using a clean decontaminated stainless steel trowel following the procedures included in the NJDEP *Field Sampling Procedures Manual* (NJDEP, 2005). The samples will be collected as follows:

- Gloves will be donned immediately prior to sampling and a clean pair of new disposable gloves will be worn each time a different location is sampled.
- At specified intervals, take small, equal portions of sample from the surface and immediately below the surface with a clean decontaminated stainless steel trowel.
- Place the sample for VOC analysis directly into the 5-gram EnCore™ sampler by inserting the coring tool into the soil, taking care not to trap air behind the sample. Wipe the exterior of the barrel to ensure a tight seal. Snap the cap in the open end.

- Place the remaining sample material into a clean decontaminated container to be homogenized. Samples will be homogenized by physically mixing the soil by gloved hand. At no time will a bare hand come into contact with the sample.
- Transfer samples into laboratory cleaned sample jars.
- Any leftover material will be placed back into the excavation area.

4.7 Post-LTTD Treatment Sampling

The output of the onsite LTTD unit will be used as onsite backfill following treatment. Prior to reuse, samples of the output will be analyzed to confirm that they are free from chemical contamination. Samples meeting the project action levels will be used as onsite backfill without further treatment. Sample results exceeding the criteria will be considered unacceptable as backfill without additional treatment. If the sample results exceed the criteria, consideration may also be given to offsite disposal of the affected material. Samples will be analyzed for metals and cyanide, VOCs, SVOCs, pesticides, PCBs, and dioxins/furans as summarized in Table 4-1.

Grab samples will be collected for the VOCs and composite samples will be collected for other analytes. The compositing procedure is designed to provide a representative sample of the treated material by combining three discrete samples from within the treated material stockpile or bin. These discrete samples will be spread evenly so that they are spatially representative of the material both horizontally and vertically (i.e., one each at shallow, medium, and deep depths along the length of the container or stockpile). For the VOC sample, one of the three discrete locations will be selected at random and sampled.

Prior to sampling, a visual inspection of the material will be performed to located areas suitable for sampling. Once the sampling locations have been determined, the following procedure will be followed for each sampling depth:

- Gloves will be donned immediately prior to sampling and a clean pair of new disposable gloves will be worn each time a different location is sampled.
- Using a clean decontaminated hand auger or sampling trowel, collect sufficient sample from three discrete sample locations into a clean decontaminated container.

- Place the sample for VOC analysis directly into the 5-gram EnCore™ sampler by inserting the coring tool into the soil, taking care not to trap air behind the sample. Wipe the exterior of the barrel to ensure a tight seal. Snap the cap in the open end.
- The remaining sample in the container should be homogenized by physically mixing the soil by gloved hand. At no time will a bare hand come into contact with the sample.
- Transfer samples into laboratory cleaned sample jars.
- Leftover sample material will be placed back into the stockpile or bin.

4.8 Offsite Topsoil/Backfill Sampling

It is anticipated that the majority of the backfill needed for site restoration will be obtained from the treated output of the onsite LTTD unit. As necessary, backfill material consisting of common and structural fill, standard topsoil, and crushed stone will be obtained from offsite sources. Backfill and topsoil from offsite sources will be tested for physical suitability and chemical parameters prior to use. Samples of topsoil and backfill materials from each offsite source will be collected and analyzed to determine that these materials do not present a threat to human health and/or the environment. Samples will be analyzed for metals and cyanide, VOCs, SVOCs, pesticides, and PCBs as summarized in Table 4-1.

A minimum of one set of laboratory analysis will be performed per 5,000yd^3 of material used. No less than one set of analyses will be performed per borrow area. As quantities of backfill/topsoil are brought onsite in excess of 5,000yd^3, one sample per additional 5,000yd^3 of material will be analyzed. Documentation certifying that all criteria have been met for offsite backfill/topsoil will be forwarded to the USACE prior to bringing any material onsite.

Grab samples will be collected for the VOCs and composite samples will be collected for other analytes. The compositing procedure is designed to provide a representative sample of the material by combining three discrete samples. These discrete samples will be spread evenly so that they are spatially representative of the material both horizontally and vertically (i.e., one each at shallow, medium, and deep depths along the length of the borrow source). For the VOC sample, one of the three discrete locations will be selected at random and sampled.

Prior to sampling, a visual inspection of the material will be performed to located areas suitable for sampling. Once the sampling locations have been determined, the following procedure will be followed for each sampling depth:

- Gloves will be donned immediately prior to sampling and a clean pair of new disposable gloves will be worn each time a different location is sampled.
- Using a clean decontaminated hand auger or sampling trowel, collect sufficient sample from three discrete sample locations into a clean decontaminated container.
- Place the sample for VOC analysis directly into the 5-gram EnCore™ sampler by inserting the coring tool into the soil, taking care not to trap air behind the sample. Wipe the exterior of the barrel to ensure a tight seal. Snap the cap in the open end.
- The remaining sample in the container should be homogenized by physically mixing the soil by gloved hand. At no time will a bare hand come into contact with the sample.
- Transfer samples into laboratory cleaned sample jars.
- Leftover sample material will be placed back into the borrow source.

4.9 Investigative-Derived Wastes

Efforts will be made throughout the field program to minimize the volume of waste derived from sampling and decontamination procedures. Investigation-derived wastes (IDW) will be shipped to a commercial disposal facility, as necessary. IDW will be managed, stored, and disposed in accordance with USEPA and United States Department of Transportation (USDOT) regulation and requirements of the receiving facility.

4.9.1 Disposable Equipment and Debris

Disposable equipment and debris, such as health and safety equipment, plastic sheeting, sampling equipment, and other equipment or debris not reused during project operations will be collected in plastic bags during sampling and placed into appropriately labeled containers. The containers will be stored in a suitable location as determined by Site personnel. As possible, the debris will be consolidated with bulk solids for offsite disposal under an approved waste disposal profile that includes a percentage of site debris in the waste stream.

4.9.2 Wastewater

Field sampling equipment will be decontaminated following procedures specified in Section 4.11 of this FSP. Decontamination fluids and other aqueous wastes generated from sampling will be collected in the field in five gallon buckets, or other appropriate container, and returned to a designated storage area for transfer to the bulk storage tank, as appropriate. The wastewater will be sampled as described in Section 4.5 and tested as required for disposal at a permitted wastewater treatment facility.

4.9.3 General Office Trash/Debris

Any Site debris that is not generated during the collection of environmental samples will be considered municipal trash. This may include any paper or non-paper office wastes, non-contact sampling wastes (e.g., plastic wrapping, cardboard boxes), or other daily trash. All municipal trash will be deposited in a collection container provided by and serviced for periodic removal by a commercial trash hauling and disposal company. No additional management, tracking, or testing of this waste will be conducted.

4.10 QA/QC Samples

QA/QC samples will be collected and analyzed as a check of field measurements and in order to verify the contract laboratory's performance on chemical samples. QA/QC samples will be collected at a frequency of ten percent of field samples collected for offsite analysis per method per matrix, with the exception of waste characterization samples, and will include blind field replicates and matrix and matrix spike duplicates sent to the primary laboratory. All QA/QC samples shall be identified in the Field Logbook. Confirmation of the collection of the QA/QC samples at the required frequency will be initiated by the samplers in the field, and verified by the Contractor Quality Control Systems Manager (CQCSM) during field audits and the project chemist during analytical data review. A log of all samples obtained, including QA/QC samples, will be maintained at the Site.

4.10.1 Replicate Samples

A field QC duplicate sample is a second sample collected at the same location as the original sample used as an indicator of overall measurement (sampling and analytical) precision. Duplicate samples are collected using identical sampling techniques, and treated in an identical manner during storage, transportation, and

analysis. QC samples will be collected as one sample, homogenized and split into two samples, separately containerized and shipped as two independent samples. Field QC samples will be collected at a rate of ten percent of the total number of field samples that are collected for laboratory analysis per matrix. Field QC samples will be shipped to the primary analytical laboratory blindly, with notations made in the daily sample log as to which environmental sample the QC sample is associated. Replicate samples will be collected, containerized, preserved, and shipped in the same manner as environmental samples per Table 4-1.

4.10.2 Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples are environmental samples to which known concentrations of target analytes have been added by the laboratory. MS and MSD samples are analyzed to evaluate the effect of the sample matrix on the analytical methodology. MS and MSD samples are generated by taking a separate aliquot of an actual field sample and spiking it with the selected target analyte(s) prior to sample preparation or extraction. The MS and MSD samples then undergo the same extraction and analytical procedures as the unfortified field sample. Additional sample volume will be collected at a rate of five percent for the analysis of MS/MSD duplicate pairs by the laboratory.

4.11 Sampling Equipment Decontamination

The following describes standard operating procedures for the decontamination of non-disposable sampling equipment and tools that may come into direct contact with a field sample intended for analytical analysis. This procedure only addresses the decontamination of equipment as it pertains to the chemical integrity of samples for analysis and is not intended for use in health and safety decontamination of personnel, materials, and equipment that may become contaminated during field operations.

4.11.1 Applicability

Decontamination of all analytical devices, sampling tools, and storage equipment that may come into direct contact with a field sample is necessary in order to achieve analytical results that are representative of true field conditions. To the extent practical, no sampling equipment will be decontaminated in the field and disposable sampling equipment will be utilized. Sufficient sampling equipment will be pre-cleaned, wrapped in aluminum foil, and brought to the field. Sample containers will be pre-cleaned in accordance with USEPA protocols and will be supplied by the laboratory.

The decontamination procedures below may be modified, upon proper managerial approval, as long as the chemical integrity of the field sample is maintained and the sample source is not permanently compromised. Anticipated contaminants and concentrations, matrices (water, air, soil, etc.), surface area of possible cross contamination, method of sampling, and many other factors are considered when establishing a sampling equipment decontamination procedure. Any modifications of the procedures below will be carefully thought out, approved by Sevenson's CQCSM and the USACE Contracting Officer or a Designated Representative, and documented accordingly. Samples will be collected from locations with the lowest known concentrations of contaminants first, progressing toward the areas of highest known contaminations. This procedure will minimize the potential for cross contamination of samples.

4.11.2 Procedures

All equipment will be considered contaminated unless determined otherwise. In order to provide consistency to the decontamination procedure, a designated sampling team crewmember will be responsible for equipment decontamination. Similarly, it is desirable to decontaminate all the equipment necessary for a field task prior to mobilization. In this way, field decontamination will be limited. As an aid to field personnel and as part of the Site QC inspections, Sevenson Checklist Number 009, "Task Specific QC Checklist – Decontamination", is included in Appendix 3.

4.11.2.1 Decontamination Equipment List

The following supplies are needed for equipment decontamination:

- Clean disposable nitrile gloves
- Wastewater container (drum, basin, or buckets)
- Clean water spraying devices (plastic squirt or spray bottles)
- Clean brushes
- Plastic garbage bags
- Non-phosphate detergent (e.g., Alconox®)
- Deionized/distilled water
- Clean plastic buckets and other containers, as needed (e.g., small plastic swimming pool)

- Plastic sheeting to cover ground at work station
- Aluminum foil
- Package labels, ink pens, and black markers
- Potable water, warm if available

4.11.2.2 General Equipment Decontamination Procedure

The following steps will be considered as Sevenson's general equipment decontamination procedure:

- Cover hands with disposable gloves.
- Wash and scrub, as necessary, with a solution of non-phosphate detergent (e.g., Alconox) and potable water.
- Rinse thoroughly with potable water.
- Rinse with deionized/distilled water.
- Air dry.

All waste liquids generated by the decontamination procedure will be containerized and tested for waste characterization. Any solid wastes generated, such as personal protective equipment, will be containerized, tested for waste characterization, and transported for disposal.

Decontaminated equipment not intended for immediate use will be wrapped in aluminum foil, placed in plastic bags, and sealed. All handling of decontaminated equipment will be performed using clean disposable gloves. Care will be exercised in the storage of decontaminated equipment, so as to not re-contaminate what has been cleaned. Sampling personnel will also avoid solvents, greases, oils, gasoline, water, dusts, and other potential sources that might contaminate the equipment before its use. Sampling personnel handling such materials shall wear protective gloves when doing so.

5.0 FIELD OPERATIONS DOCUMENTATION

5.1 Non-Conformance/QC Reporting

A non-conformance is defined as an identified or suspected deficiency or discrepancy with regard to an approved document (e.g., improper sampling procedures); an item where the quality of the end product itself or subsequent activities using the document or item could be affected by the deficiency; or an activity that is not conducted in accordance with the established plans or procedures.

Any staff member engaged in project work that discovers or suspects a non-conformance is responsible for initiating a non-conformance report to the CQCSM. The CQCSM will evaluate each non-conformance report and provide a disposition which describes the actions to be taken. The non-conformance/QC report to be used is included in Appendix 3.

The Project Manager will verify that no further project work dependent on the nonconforming item or activity is performed until approval is obtained and the non-conformance is properly addressed. If the non-conformance is related to material, the Project Manager will be responsible for identifying the nonconforming item (if practical) and indicating that it is nonconforming and is not to be used.

A copy of each non-conformance report will be included in the project file. Copies of all non-conformances shall be maintained by the CQCSM.

5.2 Field Log Book

Field logbooks are water resistant, bound notebooks that provide the means of recording data collecting activities. Sufficient information will be recorded in the logbooks to permit reconstruction of all site-sampling activities conducted. Information recorded on other project documents will not be repeated in the logbooks except in summary form where determined necessary. All field logbooks will be kept in the possession of field personnel responsible for completing the logbooks, or in a secure place when not being used during fieldwork. Upon completion of the field activities, all logbooks will be submitted to the USACE to become part of the final project file.

Entries into the logbook will be made in ink and will contain a variety of information, including:

- Date, start time, field observations, weather conditions, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry.
- Names of visitors to the Site and the purpose of their visit.
- Measurements made and samples collected, including the equipment used to make measurements, along with the date of calibration and record of results.
- Detailed description of the location of the sampling station.
- Time of sampling, sample description, depth or location at which the sample was collected, its type, volume, and number of containers.
- Field duplicate samples collected.
- Deviations from the approved procedures during collection, preparation, documentation, or transportation.
- Bottle lot numbers, reagent information, and any waste produced.

5.3 Photographic Record

Photographic documentation will be taken throughout the remedial action. Photographs will be arranged in a photo log for submission with the project final report.

5.4 Sample Documentation

Sample custody during the field activities will be performed in three phases. The first custody phase encompasses sample collection, pre-laboratory treatment procedures, and packaging and shipping procedures. The second custody phase involves sample shipment, where mode of shipment, airbill numbers, dates, and times are documented. The third custody phase involves the custody procedures employed by the laboratory. All three phases of sample custody will be performed in accordance with QAPP Worksheet #26 and #27 to provide that:

- Samples are uniquely identified.
- The correct samples are tested and are traceable to their source.
- Important sample characteristics are preserved.
- Samples are protected from loss or damage.
- A record of sample integrity is established and maintained through the entire custody process.

5.4.1 Sample Numbering System

A unique sample numbering scheme will be used to identify each sample designated for laboratory analysis. The purpose of this numbering scheme is to provide a tracking system for the retrieval of analytical and field data on each sample. Sample identification numbers will be used on all sample labels or tags, field data sheets or logbooks, chain of custody (COC) records, and all other applicable documentation used during the project. A listing of all sample identification numbers will be maintained in the field logbook. The project database will be populated with sample numbers and information consistent with information found here and in the QAPP. The sample identification scheme to be used is as follows:

Solid waste characterization samples will be labeled: CD-WC-xx

- CD-WC — Project site and sample type (Cornell-Dubilier waste characterization sample)
- xx — Sequential sample number

Wastewater characterization samples will be labeled: CD-WW- xx

- CD-WW — Project site and sample type (Cornell-Dubilier waste water sample)
- xx — Sequential sample number

Post-excavation confirmation samples will be labeled: CD-Grid-xx-Location

- CD — Project site (Cornell-Dubilier)
- Grid — Grid from which sample was collected
- xx — Sequential sample number
- Location — Location of sample as follows: FL = excavation bottom, SW = south sidewall, WW = west sidewall, EW = east sidewall, NW = north sidewall

Post-LTTD treatment samples will be labeled: CD-PT-date

- CD-PT — Project site and sample type (Cornell-Dubilier post-treatment)
- Date — Sample collection date in MMDDYY format

Offsite backfill and topsoil samples will be labeled: CD-BF- xx or CD-TS- xx

- CD-BF/CD-TS — Project site and sample type (Cornell-Dubilier backfill sample or Cornell-Dubilier topsoil sample)
- xx — Sequential sample number

5.4.2 Sample Labels and/or Tags

In accordance with QAPP Worksheet #27, immediately after a sample has been collected, a self-adhesive identification label will be completed in indelible ink and neatly affixed to the outside of the sample container. After completing the sample label, it will be covered with clear tape for protection. The following information will be legibly entered on all sample labels:

- Contractor name
- Sample type (grab or composite)
- Analysis/method to be performed
- Type of chemical preservative present in the container
- Site name
- Date and time of sample collection
- Sample identification number
- Sampler's name or initials

Sample logbooks and COC records will contain the same information as the labels affixed to the sample containers. These records will record all information related to the sampling effort and the process employed.

5.4.3 Chain of Custody Records

The COC guidelines create an accurate written record that can be used to trace possession and handling of the sample from the moment of its collection through analysis. COC forms will be completed for each sample at the time of collection and will be maintained while shipping the sample to the laboratory in accordance with QAPP Worksheet #27.

5.4.4 Custody Seals

Shipping containers must be sealed with custody seals for shipment to the laboratory. When samples are shipped, two or more custody seals are to be placed on each shipping container, with at least one at the front and one on the side, located in a manner that would indicate if the container were opened in transit. Wide, clear packaging tape should be placed over the custody seals to ensure that the seals are not accidentally broken

during shipment. Upon receipt of the sample coolers, the sample custodian must check and confirm that all custody seals on the coolers are intact.

5.5 Corrections to Documentation

All original data recorded in field notebooks and on sample identification labels, chain-of-custody records, and sample receipt forms are written in waterproof ink. These documents are not to be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document, the individual entering the information/data will make the corrections. A single solid line (in indelible ink, preferably) will be made through the errant entry. Under no circumstances shall a correcting fluid (e.g., White-Out®) be used or any erasures made. The erroneous information should not be obliterated. Each correction shall be dated and initialed by the individual making the correction.

Should any improper correction of returned paperwork (e.g., laboratory-signed COCs, analytical reports) be suspected, it should be brought to the attention of the Site Project Manager immediately for further action, as necessary.

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6.0 SAMPLE PACKAGING AND SHIPPING

Custody of samples will be maintained throughout the shipment of samples to the selected laboratory. All samples will be packaged and shipped at the end of each day unless other arrangements are made with the laboratory. No samples will be shipped on Friday unless prior arrangements are made with the laboratory for Saturday sample receipt. Samples will be packaged and delivered directly to the laboratory in accordance with the procedure in QAPP Worksheet #27.

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7.0 CONTRACTOR QUALITY CONTROL

Contactor quality control (CQC) is the means by which the contractor ensures that the field activities comply with the requirements of the contract. The CQCSM will ensure that Sevenson maintains quality throughout all fieldwork by means of a three-phase process performed onsite for each definable work element. The three phases of control include the preparatory phase, the initial phase, and the follow-up phase. Examples of the inspection checklists for the three-phase procedures have been provided in Appendix 3 of this SAP. These activities are further defined below.

7.1 Preparatory Phase

The preparatory phase of the CQC program will be performed prior to the initiation of remedial activities or phases of remedial activities, after all required plans, documents, and materials are accepted and approved, and will consist of a meeting conducted by the Sevenson CQCSM. This meeting will have minutes recorded and will occur prior to the initiation of sampling activities or phases of remedial activities. The meeting may include:

- Review of the planned activities to assure field personnel and subcontractors are aware of overall data quality objectives, the specific type of data being collected, and specific sampling and data analysis requirements.
- Review of all required forms.
- Review of equipment decontamination procedures.
- Review of proper IDW management and storage.
- Review of proper sample collection, packaging, and documentation.
- Review of field equipment and support material checklists.
- Confirm any required preliminary tasks are complete.
- Review safety issues and analyze for any potential hazards.
- Review of other issues as deemed necessary by the Sevenson CQCSM.

The USACE will be notified at least 48 hours in advance of the preparatory control phase. The results of the preparatory phase actions will be documented by minutes prepared by the CQCSM and attached to the Daily Quality Control Report.

7.2 Initial Phase

The Sevenson CQCSM shall oversee and confirm compliance with the FSP and QAPP at the initiation of each definable work feature. The CQCSM will observe and document compliance and/or deviations from the approved FSP and QAPP. Minutes of this phase will be prepared and attached to the daily QC report. Activities will include:

- Oversight of sampling and field activities to assure compliance with contract terms.
- Oversight of sample acquisition, labeling, and shipping.
- Oversight of sampling equipment decontamination.
- Inspection of all required documentation, including field notebooks and chain of custody forms to assure completeness, consistency, and accuracy.
- Completion of QC Inspection Report and Task-Specific QC Checklists (copies included in Appendix 3 of this SAP).
- Verification that activities are conducted according to the SSHERP to assure worker and community safety.

The USACE will be notified at least 48 hours in advance of the beginning the initial phase. The initial phase will be repeated for each new work crew to work onsite, or at any time acceptable quality standards are not being met.

7.3 Follow-Up Phase

The Sevenson CQCSM will provide daily inspections to ensure compliance with the FSP and QAPP until completion of each definable work element. This daily inspection will document deficiencies noted during the initial phase, communicate any such deficiencies to both field personnel and the project manager, provide appropriate methods to correct the deficiencies, and follow up with the affected personnel to assure corrective measures are implemented. This phase will include the completion of the daily chemical quality control report (DCQCR), a copy of which is included in Appendix 3 and further discussed in Section 8.1 of the FSP.

8.0 SITE REPORTING AND DAILY CHEMICAL QUALITY CONTROL REPORTS

8.1 Daily Chemical Quality Control Reports

Sevenson's CQCSM or appropriate designee will prepare and sign a DCQCR on days that chemical sampling is performed. A copy of the DCQCR form is provided in Appendix 3. The reports will be sequentially numbered and submitted on a regular basis to the Contracting Officer or a Designated Representative attached to the Daily Quality Control Report. The following will be attached to the DCQCR for final hard-copy submittal to the USACE: copies of COC forms, sample shipment bills of lading, copies of applicable field logbook pages, and any other relevant project forms (e.g., corrective action forms, field change request forms).

The CQCSM will report any deviations that may affect DQOs immediately to the USACE. Any instructions given by the USACE will be recorded in the DCQCR along with the appropriate corrective actions, as applicable.

The DCQCR will contain the following elements:

- Job identification and site number.
- Chemical data acquisition performed in the field and in the laboratory.
- Chemical data QC activities implemented as part of the three-phase control system.
- Sample and measurement problems that may affect project DQO requirements.
- Corrective actions and/or deviations from the approved FSP and QAPP, including approvals.
- A summary of the feedback procedure for any corrective actions taken.
- Confirmation that all deviations or actions jeopardizing project DQOs have been forwarded to project management.

8.2 Laboratory Analytical Data Reports

Each sample collected during sampling events for offsite chemical analysis will be sent to the appropriate analytical laboratory. Upon completion of analysis, the laboratory will prepare an analytical data report for each sample. Specifics of analytical report preparation and requirements can be found in Worksheet #11 of the

QAPP. The chemistry data package will contain information to demonstrate that the project DQOs have been fulfilled.

8.3 Quality Control Summary Report

A Quality Control Summary Report (QCSR) will be prepared on a quarterly basis once all applicable data has been received from the laboratory. The QCSR will include a summary of all chemical sampling activities and will include an evaluation of the achievement of chemical DQOs.

The QCSR will contain the following elements:

- Summary of project scope and description.
- Summary of DCQCRs
- Summary of deviations from the chemical sample specifications.
- Summary of chemical samples performed as contingent measurements.
- Summary discussion of resulting data including achieving minimum data reporting requirements.
- Summary of achievement of project DQOs.
- Presentation and evaluation of data, including overall assessment of data quality and usability.
- Internal QC data generated during the project, including summaries of QC information from blanks, matrix spikes, surrogates, duplicates, laboratory control samples, batch identifiers, and chemical yields.
- A list of affected sample results, including appropriate data qualifier flag, where such results are negatively affected by adverse QC criteria.
- A summary of field and laboratory oversight activities.
- Conclusions and recommendations.
- Attachments, including final data packages.

9.0 CORRECTIVE ACTIONS

Corrective actions will be implemented when a discrepancy is discovered by field or laboratory personnel or during field or desk audits. The Sevenson CQCSM will coordinate and facilitate corrective actions. If the problem is determined to be minor, the corrective action will be recorded in the field notes, with verbal notifications to other field teams or subcontractors about the deficiency and the corrective action. If the deficiency is severe and may affect the project DQOs, a formal written review and corrective action will be initiated, called a Non-Conformance Report (NCR). The NCR will identify the deficiency, identify how the deficiency might affect the work product, propose corrective action, and document that the corrective action has been taken. The Sevenson CQCSM will supervise this process. In addition, the CQCSM will maintain a log of all NCRs for the project and ensure that the NCRs and corrective actions are maintained with final project files. Details of non-conformances and corrective actions are provided below.

9.1 Non-Conformance

A nonconformance is an unauthorized deviation from documented sampling or analysis procedures, practices or standards, or a defect in an item that is sufficient to render the quality of a sample or datum unacceptable or indeterminate. Field non-conformances may include, but are not limited to, the following:

- Incorrect sampling procedures.
- Failure of field instrumentation.
- Improper instrument calibration.
- Incorrect sample preservation.
- Incorrect sample packaging.
- Inappropriate sample shipment resulting in exceeded holding times.
- Incorrectly identified samples.

If a non-conformance is suspected, the CQCSM for the project will be notified as soon after the situation is identified as possible. For field non-conformances, the project manager or field sampler will make the notification; for laboratory non-conformances, the laboratory QC Manager will make the notification. After evaluation of the potential non-conformance situation, the CQCSM will notify the USACE Contracting Officer or a Designated Representative.

9.2 Corrective Action

Corrective actions are required for two classes of problems: analytical and equipment problems and noncompliance (i.e., those which do not follow the written procedures stated in the Site plans). A sample corrective action form is included in Appendix 3 of this SAP. Corrective actions for field and analytical activities may include:

- Repeating the measurement to check for error.
- Recalibration of instruments using freshly prepared calibration standards.
- Check for adequate power supply or operation.
- Replacement of sampling or analytical equipment.
- Reanalysis of samples.
- Re-sampling.
- Additional training of field personnel in correct implementation of sample preparation, collection, or analytical methods.
- Reassignment of personnel, if necessary, to improve the overlap between operator skills and sampling requirements.
- Communication with the CQCSM to determine the appropriate action (e.g., insufficient sample remaining for reanalysis).

Prior to implementation, Sevenson's CQCSM will approve all corrective actions planned to address deviations from the SAP. The CQCSM will ideally submit a report within 48 hours of the non-conformance event to the Contracting Officer or a Designated Representative. The CQCSM is responsible for ensuring that all corrective actions are initiated by:

- Evaluating all reported non-conformances.
- Modifying or stopping additional work on non-conformance items.
- Determining action to be taken.
- Maintaining a log of non-conformances.
- Reviewing non-conformance reports and corrective action reports.
- Ensuring that any non-conformance is included in the DCQCR and that all reports are made part of the final Site document files.

10.0 REFERENCES

Cornell Dubilier Electronics Site Information Sheet, USEPA, July 2006.

Field Sampling Procedures Manual, NJDEP, August 2005.

Identification and Listing of Hazardous Waste, 40CFR261, 1999.

NJDEP SRP Regulations and Guidance, Last Updated 5/12/99; http://www.state.nj.us/dep/srp/regs/scc/

PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions, 40CFR761, 1999.

Project Specifications for Cornell-Dubilier Electronics Superfund Site – OU2, USACE, 2008.

Requirements for the Preparation of Sampling and Analysis Plans (EM 200-1-3), USACE, February 2001.

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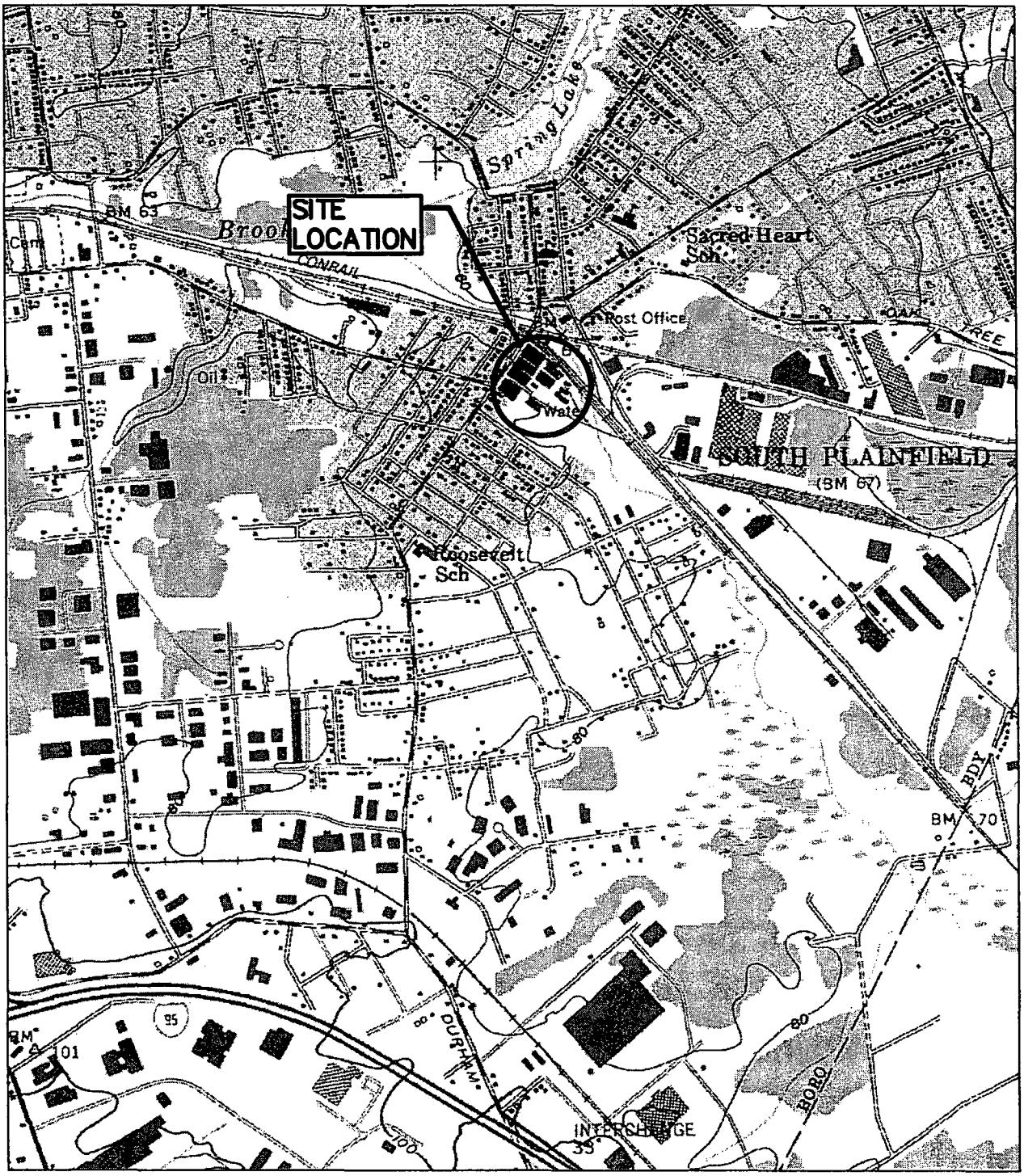
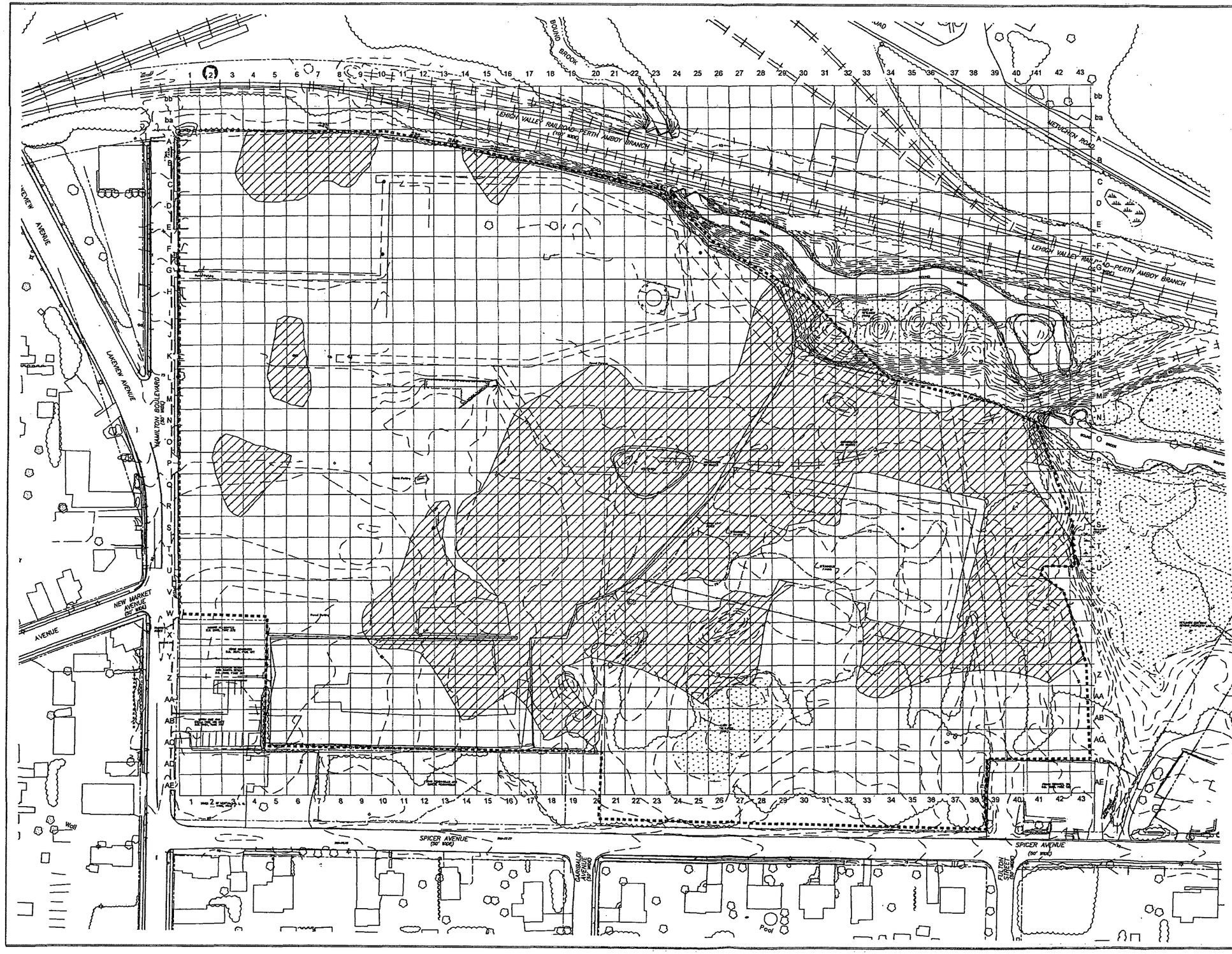
APPENDIX 1

FIGURES



SOURCE: U.S.G.S. TOPOGRAPHIC MAP,
7.5 MINUTE SERIES, PLAINFIELD, NEW JERSEY
QUADRANGLE, 1955, PHOTOREVISED 1981

MALCOLM PIRNIE	U.S. ARMY CORPS OF ENGINEERS CORNELL-DUBILIER SUPERFUND SITE OU-2 SOILS SOUTH PLAINFIELD, NEW JERSEY CONTRACT NO. W912DQ-06-D-0006 TO 0001	SITE LOCATION MAP SCALE AS NOTED	MALCOLM PIRNIE, INC. JULY 2007 FIGURE 1-1



LEGEND:

APPROXIMATE LIMITS OF CONTAMINATION

60 0 60
SCALE IN FEET

Sample Grid Layout

Cornell Dubilier Electronics
Superfund Site
OU-2 Soils Remediation
South Plainfield, New Jersey

SEVENSON ENVIRONMENTAL SERVICES, INC.

DRAWING	
DATE:	10/28/08
DRAWN BY:	C. Bigelow
CHECKED BY:	K. Lickfield
CAD FILE:	Sample Grid
SCALE:	as shown

APPENDIX 2

DATA QUALITY OBJECTIVES

Appendix 2

Data Quality Objectives

Operable Unit 2 – Soil Remediation
Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Data quality objectives (DQOs) are used to help decision makers collect data of the right type, quality, and quantity to support decisions. The approach to developing DQOs is designed to take decision makers through a strategic planning process from broad project goals through a number of refining steps towards generating environmental data that will be appropriate to making the decisions needed to reach the goals.

1.0 State the Problem

The site formerly occupied by the Cornell-Dubilier Electronics, Inc. in South Plainfield, New Jersey will *most likely* be restored and redeveloped for commercial/industrial use. Soils contain contaminants of concern, primarily polychlorinated biphenyls (PCBs), which will need to be removed prior to redevelopment. Elevated concentrations of contaminants of concern in soils may pose a threat through direct contact and as a source of contamination to groundwater.

This task addresses the remediation of soils associated with Operable Unit 2 (OU-2) of the site. The USEPA signed a Record of Decision (ROD) for the CDA in September 2004. The objectives of the current remedial action are:

- Excavation of an estimated 107,000 cubic yards of contaminated soil containing PCBs with concentrations greater than 500 parts per million (ppm) and contaminated soils that exceed the New Jersey Department of Environmental Protection (NJDEP) Impact to Groundwater Soil Cleanup Criteria (IGWSCC) for contaminants other than PCBs.
- Onsite treatment of excavated soils amenable to treatment by low temperature thermal desorption (LTTD), followed by backfilling of excavated areas with treated soils.
- Transportation of contaminated soil and debris not suitable for LTTD treatment to an offsite facility for disposal, with treatment as necessary.
- Installation of multi-layer cap or hardscape.
- Installation of engineering controls.
- Property restoration.

- Implementation of institutional controls.

2.0 Identify the Decision

To meet the objectives, the following fundamental questions will need to be answered during the investigation:

- What are the disposal facility requirements to classify the soils and debris excavated from the site under RCRA and TSCA regulations?
- Has the full extent of contaminated soil been removed from the site or is further excavation required such that no soils with concentrations greater than the NJDEP IGWSCC and USEPA ROD criteria remain at the site?
- Has the soil treated in the onsite LTTD unit been treated adequately to be used as onsite backfill?

3.0 Identify the Inputs to the Decision

The following inputs are required to answer the fundamental questions identified in Step 2 above:

- Review existing data. This includes analytical data as well as past practice and process history.
- Determine the appropriate analytical methods, keeping in mind that the methods must meet the sensitivities of the applicable regulatory limits and remediation goals.
- Collect soil samples to fully characterize the soils such that the offsite disposal facilities are satisfied.
- Collect soil samples following excavation to demonstrate that soils left behind are not hazardous to human health or the environment.
- Collect soil samples following LTTD treatment to demonstrate that they are not hazardous to human health or the environment.

4.0 Define the Boundaries of the Study

The physical boundaries of the investigation have been defined as OU-2.

5.0 Develop a Decision Rule

The purpose of this step is to integrate the outputs from the previous steps into a statement that defines the conditions that would cause the decision makers to choose among alternative actions. The following primary decision rules will be used to answer the fundamental questions:

- Waste characterization sample results will be compared against the 40CFR261 *Characteristics of Hazardous Waste* and 40CFR761 *PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions* to determine the disposal requirements. Any materials containing Resource Conservation and Recovery Act (RCRA) regulated constituents at concentrations greater than toxicity characteristic leachate procedure (TCLP) criteria will be disposed of as RCRA hazardous waste. Any materials containing concentrations of total PCBs greater than the regulatory standards will be disposed of as Toxic Substance Control Act (TSCA) regulated PCB remediation wastes. Any materials exceeding both criteria will be disposed of as RCRA/TSCA waste.
- Final verification soil samples will be compared against the NJDEP IGWSCC and against the USEPA ROD (September 2004) cleanup criteria of 5ppb toxic equivalents (TEQ) for dioxin and furan isomers. If any concentrations greater than the cleanup criteria are detected, additional excavations will be conducted until all concentrations of the contaminants of concern are less than the cleanup criteria.
- Post-LTTD treatment soil samples will be compared against the NJDEP IGWSCC and against the USEPA ROD (September 2004) cleanup criteria of 5ppb TEQ for dioxin and furan isomers. Treated soil with concentrations less than the cleanup criteria will be used as site backfill. Treated soil with concentrations greater than the cleanup criteria will be undergo additional treatment in the onsite LTTD unit or will be considered for offsite disposal.

6.0 Specify Limits on Decision Errors

This step is to specify the decision maker's acceptable limits on decision errors, which are used to establish appropriate performance goals for limiting uncertainty in environmental data. These acceptable limits on decision errors allow decision makers to generate effective sampling designs while limiting uncertainties in the collected data.

There are two types of decision errors applicable to estimating the true value of a population: 1) sampling design error, which occurs when the sampling design is unable to capture the complete state of natural

variability over space and time; and 2) measurement error, which refers to a combination of random and systematic errors. The combination of sampling design error and measurement error is termed as the total study error. Since it is impossible to eliminate error in measurement data, two types of decision errors can occur: Type I and Type II. A Type I or false positive error occurs when a null hypothesis is true, but is mistakenly rejected. A Type II or false negative error occurs when a null hypothesis is false, but is not rejected.

In this investigation, the false rejection error is concluding that soils do not contain contaminants of concern with concentrations exceeding the action levels when there are actually contaminants of concern with concentrations that exceeded the action levels. The false acceptance error is concluding that the soils do contain contaminants of concern with concentrations that exceeded the action levels when there are actually no contaminants of concern with concentrations that exceeded the action levels.

The consequences of the false acceptance decision will be unnecessary expenditure of resources such as funding, personnel, and time. The consequence of the false rejection error is that contaminants of concern in soils will not be remediated and will pose unacceptable risk to the environment or human health. Because of the possible severity of the false rejection error consequence, the false acceptance error is more tolerable than the false rejection error. The false acceptance decision error will occur when the analytical results are biased high and the false rejection decision error will occur when the analytical results are biased low.

7.0 Optimize the Design for Obtaining Data

This step involves identifying the most resource effective sampling and analysis design for generating data that are expected to satisfy project DQOs.

The consequence of the decision error will need to be balanced against the cost of limiting the possibility of these errors. These errors will be managed by the use of precise and accurate analytical methods, sampling techniques (e.g., compositing for waste characterization), and duplicate sample analysis. To minimize unacceptable errors, laboratory analyses with a high degree of confidence and extensive quality assurance and quality control (QA/QC) and documentation procedures will be utilized.

APPENDIX 3

STANDARD SAMPLE TRACKING AND DOCUMENTATION FORMS, REVIEW FORMS AND CHECKLISTS

SAMPLE IDENTIFICATION LABEL

I-CHEM

CLIENT/SOURCE	☐ GRAB ☐ COMPOSITE OTHER:
SITE NAME	DATE
SAMPLE #	TIME
ANALYSIS	PRESERVATIVE
	COLL. BY

CHAIN-OF-CUSTODY FORM

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME					PARAMETERS									INDUSTRIAL HYGIENE SAMPLE	Y / N
SAMPLERS: *(Signature)*					(Printed)	NO. OF CONTAINERS									REMARKS	
FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION											

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
(Printed)		(Printed)	(Printed)		(Printed)

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks
(Printed)		(Printed)		

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

Preparatory Phase Checklist

Contract:	Date Preparatory Held:
Spec. Section & Paragraph:	Definable Feature of Work:
Drawing Sheet Numbers:	Major Definable Feature:

A. Personnel Present

Name	Position	Company

B. Has each spec. paragraph, drawing, and shop drawing detail been studied? Yes ___ No ___

C. Transmittals Involved

Number and Item	Code	Contractor/Government Approval

Have all items involved been approved? Yes _____ No_____

D. Are all materials on-hand? Yes ____ No_____

Are the materials on the job-site to be incorporated the same as those approved?
Yes _____ No _____

Have all materials been checked for contract compliance against approved shop drawings? Yes ____ No _____

Equipment to be used in executing the work:

Items not on-hand or not in compliance with transmittals:

E. Tests required in accordance with contract requirements:

Test	Paragraph

F. Accident Prevention Planning - Hazard Control Measures:

Activity Hazard Analysis

Activity	Hazard(s)	Controls

Operational Equipment Checklist

Attached For:

On File For:

G. Have procedures for accomplishing work been reviewed with appropriate people?

Yes ___ No

Scope of Work/Method of Construction:

Safety Issues:

Spill Prevention Issues:

H. Has all preliminary work been accomplished in accord with contract requirements and is this segment of work ready to start? Yes ___ No

Explain any problems:

I. Remarks:

USACE Comments:

Sevenson Comments:

CQC Systems Manager

Project Engineer

Initial/Follow-Up Phase Inspection Checklist

Inspection Type: ☐ Initial Phase ☐ Follow-Up Phase

Date: _____ Specifications Paragraph: _____

Description and location of work inspected: _____

_____

Reference contract drawings: _____

A. Personnel Present

Name	Position	Company

B. Materials being used are in strict compliance with the Contract Plans and Specifications?
YES _____ NO _____
If not, explain: _____

_____

C. Procedures and/or work methods witnessed are in strict compliance with the requirements of the Contract Specifications? YES _____ NO _____
If not, explain: _____

_____

D. Workmanship is acceptable? YES _____ NO _____
State areas where improvement is needed: _____

_____

E. Safety violations and corrective actions taken: _____

_____

F. Remarks: _____

_____

_____

_____ _____

Quality Control Representative Project Engineer

DAILY CHEMICAL QUALITY CONTROL REPORT

Date: _____

Job Identification and Site Numbers: _____

_____

Weather: _____

_____

Subcontractors Present Onsite: _____

_____

Health and Safety Measures Necessary for Planned Activities: _____

_____

Health and Safety Violations and Corrective Actions: _____

_____

_____

Planned Daily Activities: _____

_____

_____

Description of Chemical Data Acquisition Work Performed: _____

_____

_____

Sample Shipments and Problems Regarding Sampling and Sample Shipments: _____

_____

Chemical Parameter Measurement Problems: _____

_____

_____

Contingency Sampling: _____

_____

_____

Non-conformance Problems: _____

_____

_____

Corrective Actions (including approvals): _____

_____

_____

Initials of Personnel Performing Corrective Actions: _____

Implemented Chemical Quality Control Activities (including summary of feedback resulting from corrective actions taken): _____

_____

_____

CERTIFICATION: As Chemical Quality Control Manager, I certify that the above report is complete and correct and that I, or my authorized representative, have inspected all work performed this day by key staff and have determined that all materials, equipment and workmanship are in strict compliance with the plans and specifications, except as my be noted above.

_____ _____

Signature Date

SITE QC INSPECTION REPORT

Project Name _____ Client/Generator _____

Sevenson Job # _____ Contract # _____

Project Location _____ Task Order # _____

Inspection Date _____ Inspection Time _____

Inspected By _____

Sevenson Project Manager_____ Client/Generator Project Manager _____

Site Telephone # _____ Contact Telephone # _____

Site Facsimile # _____ Contact Facsimile # _____

Site Email Address _____

Site Plans/Activities

Construction Management Plan/Work Plan

Original Approval Date _____
Revision Approval Date (if applicable) _____

YES	NO	
☐	☐	Current Plan Copy Available Onsite
☐	☐	Spill Response equipment/materials available?
☐	☐	Soil erosion/sediment controls in-place?
☐	☐	Work zones (EZ, CRZ, SZ) clearly delineated?
☐	☐	All equipment inspections being documents (in and out)?

COMMENTS:_____

_____

_____

_____

_____

Health and Safety

Original Plan Approval Date _____
Revision Approval Date (if applicable) _____

YES	NO	
☐	☐	Current Plan Copy Available Onsite
☐	☐	Activity Hazard Analysis Complete and Updated
☐	☐	Daily Safety Meetings Conducted and Documented
☐	☐	Emergency Response Information Posted
☐	☐	Medical and Training Documentation Current
☐	☐	Daily Safety Logs Completed
☐	☐	Chemical Inventory Updated
☐	☐	Inspections Completed and Documented
☐	☐	Map to hospital prominently displayed?
☐	☐	Is work being conducted safely?

COMMENTS: _____

_____

_____

Sampling and Analysis

Original Plan Approval Date _____
Revision Approval Date (if applicable) _____

YES	NO	
☐	☐	Is a current plan copy available onsite?
☐	☐	Has a review of the Plan and all relevant SOPs with all site sampling been conducted?
☐	☐	Are field logbooks and other site documentation maintained properly and in a secure area?
☐	☐	Are Preparatory Inspections being conducted prior to each sampling event?
☐	☐	Are Initial and Follow-up Inspections being conducted for each sampling event?
☐	☐	Is the site Sampling Manager performing periodic field audits of all sampling activities?
☐	☐	Is field documentation being reviewed by the site Sampling Manager prior to the completion of each days' sampling events?
☐	☐	Is the Sampling Manager performing field audits of sample labeling, chain-of-custody, packing and shipping activities?
☐	☐	Are Daily Chemical Quality Control Reports (DCQCR) being completed each day and properly?
☐	☐	Are DCQCR, instrument maintenance and calibration, nonconformance/corrective action reports and sampling logs current?

COMMENTS: _____

_____

_____

Project Work Tasks	Sevenson Checklist #
(Check all that apply and attach completed QC Report)	
☐ Monitoring Well Installation, Development, and/or Abandonment	SES 001
☐ Groundwater Monitoring Well Sampling	SES 002
☐ Surface Water Sampling	SES 003
☐ Subsurface Soil Sampling	SES 004
☐ Drum/Tank Sampling	SES 005
☐ Mobile Laboratory	SES 006
☐ Packing, Storing, and Shipment of Samples	SES 007
☐ Field Documentation	SES 008
☐ Decontamination	SES 009
☐ Sample Cooler Shipment	SES 010
☐ Onsite Waste Storage	SES 011
☐ Offsite waste Transport/Disposal	SES 012

COMMENTS: _____

_____

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_____

Sevenson Project Manager _____

Name Signature Date

QC Reviewer _____

Name Signature Date

CQC Systems Manager _____

Name Signature Date

TASK SPECIFIC QC CHECKLIST
Work Task: Packing, Storing, and Shipment of Samples
Sevenson Checklist #007

Project Name/Job Number: _____
Inspection Date: _____

Complete this form for each cooler/shipment inspected. Answer each question by checking the appropriate column (yes, no, not observed (N/O), or not applicable (N/A)). If "no" is checked, provide an explanation of the non-compliance and associated corrective action(s).

	Yes	No	N/O	N/A
Were the samples handled according to the FSP and QAPP?				
Did the samples remain on ice or refrigerated (except for sample transfer from coolers or refrigerators) from collection until the cooler was taped for shipment?				
Were sample containers prepared for shipment (bubble-wrap, Zip-Lock™ bags, etc) per SAP procedures?				
Was a trip blank (for VOC samples only) and a temperature blank included in each cooler?				
Was loose ice double Zip-Lock™- bagged prior to placement in cooler?				
Was ice placed in equal proximity to all sample containers and the temperature blank to ensure samples arrive at lab at 4°C?				
Were Chain-of-Custody forms filled out accurately and completely, including the project name and number, sampling date and time, analytical parameters, preservatives, size and number of containers for each analytical parameter, and media sampled?				
Were Chain-of-Custody forms signed and dated by the preparer and the form taped to the inside of the cooler lid?				
Were signed and dated custody seals properly placed on the cooler and the cooler sealed with strapping tape?				
Was a shipping label attached to the cooler?				
Were COCs and shipping tracking labels faxed to lab?				

Notes/Comments

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_____
_____

QC Inspector Name and Signature

_____

_____

Date

_____

TASK SPECIFIC QC CHECKLIST
Work Task: Field Documentation
Sevenson Checklist #008

Project Name/Job Number: _____
Inspection Date: _____

Complete this form for each day samples are taken. Answer each question by checking the appropriate column (yes, no, not observed (N/O), or not applicable (N/A)). If "no" is checked, provide an explanation of the non-compliance and associated corrective action(s).

	Yes	No	N/A
Was all original field data recorded in black indelible ink?			
Were logbooks filled out properly, accurately recounting the day's events?			
Were all field forms completed and information accurately recorded?			
• Field Sampling Forms			
• Chain of Custody Forms			
• Field Log Books			
• Field Change Request Forms			
• Additional Forms (list below)			
Was field documentation forwarded to Sevenson office for peer/QC review?			
Were deficiencies reported to the Field Sampling Manager?			

Notes/Comments

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_____
_____

QC Inspector Name and Signature

_____

_____

Date

_____

TASK SPECIFIC QC CHECKLIST
Work Task: Decontamination
Sevenson Checklist #009

Project Name/Job Number: _____
Inspection Date: _____

Complete this form for each day samples are taken. Answer each question by checking the appropriate column (yes, no, not observed (N/O), or not applicable (N/A)). If "no" is checked, provide an explanation of the non-compliance and associated corrective action(s).

	Yes	No	N/O	N/A
Was *all* sampling equipment decontaminated properly prior to use and between sample intervals?				
Was each decontamination event recorded in the logbook?				
Was investigation derived waste (IDW) (e.g., decontamination water, personal protective equipment (PPE), etc.) handled properly?				
Were the location, type, number and source of containers of IDW recorded in the logbook?				
Was Sevenson Technical Services notified if IDW requires offsite disposal?				

Notes/Comments

_____
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_____

QC Inspector Name and Signature

_____

_____

Date

_____

TASK SPECIFIC QC CHECKLIST
Work Task: Sample Cooler Shipment
Sevenson Checklist #010

Project Name/Job Number: _____
Inspection Date: _____

☐ **PREPARATORY PHASE**

Yes	*No*	*N/A*		*Comment*
☐	☐	☐	Have sample shipment procedures in the SAP been reviewed by all field sampling personnel?	
☐	☐	☐	Are sufficient numbers of clean, hard plastic coolers available onsite to meet current sampling schedule?	
☐	☐	☐	Are sufficient packing supplies (i.e. Ziplock™ plastic bags, packing "peanuts", sealing tape, etc.) available onsite?	
☐	☐	☐	Are laboratory chain-of-custody forms, custody seals, and extra sample container labels available onsite?	
☐	☐	☐	Has a common carrier (Federal Express, UPS, etc.) been selected and have package pickup points and times been identified?	
	☐	☐	Will sample coolers be D.O.T. regulated for shipping purposes and are D.O.T. required shipping labels and logs available at the site?	
☐	☐	☐	Have the offsite primary and QA laboratories been contacted to verify anticipated sample collection and shipment schedules?	
☐	☐	☐	Does the primary and QA laboratory have a list of sample shipping site contacts should there be problems or questions?	
☐	☐	☐	Is an ice source available on or near the site?	

☐ **INITIAL PHASE** **OR** ☐ **FOLLOW-UP PHASE**

Yes	*No*	*N/A*		*Comment*
☐	☐	☐	Has a Preparatory Phase meeting been conducted?	
☐	☐	☐	Where sample containers received from the field properly labeled , prepared, and recorded in the field logbook and in the site sample summary log per the SAP?	
☐	☐	☐	Was the sample cooler inspected to verify that it was clean, undamaged, and had no external markings or shipping addresses unrelated to the project?	

☐	☐	☐	Was the cooler inspected to verify that the site name, address, telephone number and contact name was written in indelible ink on the interior of the cooler lid?	
☐	☐	☐	Was the cooler drain plug (if present) securely taped shut on both the interior and exterior sides?	
☐	☐	☐	Was a clean, new plastic garbage bag placed into the cooler as a secondary liner?	
☐	☐	☐	Where all samples, field duplicates, QA splits, and rinse blanks verified by checking sample labels against field logbook entries as chain-of-custody forms were completed?	
☐	☐	☐	Were chain-of-custody forms completed per SAP?	
☐	☐	☐	Were sample containers placed into separate Ziplock™ bags before being placed in an upright position in the cooler?	
☐	☐	☐	Was packing material placed between sample containers to prevent shifting or breakage during shipment?	
☐	☐	☐	Was a temperature blank placed in close proximity to sample containers?	
☐	☐	☐	If required, was double Ziplock™-bagged ice placed in the cooler in contact with all sample containers?	
☐	☐	☐	Was the outer garbage bag sealed with a twist-tie or knot?	
☐	☐	☐	Were chain-of-custody forms placed inside a Ziplock™ bag and taped to the inner lid of the cooler?	
☐	☐	☐	Was the closed cooler lid checked to verify a proper closure and was fiber-reinforced strapping tape placed around both of its ends at least twice?	
☐	☐	☐	Were handling labels and D.O.T. hazard labels (if required) placed on the outside of the cooler?	
☐	☐	☐	Were a minimum of two (front and side) completed custody seals placed across the lid opening to verify cooler integrity?	
☐	☐	☐	Was an address label with both the "shipped from" and "shipped to" addresses applied to the top of the cooler?	
☐	☐	☐	Was the common carrier airbill (or other shipping form) properly completed and attached to the cooler?	
☐	☐	☐	Was the "shipper's copy" of the airbill retained at the site and attached to the DCQCR?	
☐	☐	☐	Were all destination laboratories notified of sample shipments?	

Comments: _____

_____

_____

_____

Sevenson Project Manager _____

Name Signature Date

QC Reviewer _____

Name Signature Date

CQC Systems Manager _____

Name Signature Date

Field Change Request Form

PROJECT MANAGER:_____
PROJECT:_____
JOB NUMBER:_____
CONTRACT NUMBER:_____
DATE:_____
FIELD CHANGE REQUEST NUMBER:_____

Weather

	Bright Sun	Clear	Overcast	Rain	Snow
Temp	To 32	32-50	50-70	70-85	85 up
Wind	Calm	Moderate	High		
Humidity	Dry	Moderate	Humid		

SUB-CONTRACTORS ON SITE:			
EQUIPMENT ON SITE:			
SAMPLING PERFORMED:			
NON-CONFORMANCE/PROBLEM ITEM(S):			
PROJECT QA/QC OFFICER NOTIFIED:	TIME	DATE	INITIALS
PROJECT MANAGER NOTIFIED:	TIME	DATE	INITIALS
CONTRACTING OFFICER NOTIFIED:	TIME	DATE	INITIALS
PROJECT TECHNICAL DIRECTOR NOTIFIED:	TIME	DATE	INITIALS
WORK STOPPED? _____ YES	_____ NO		
IF NOT, EXPLAIN			

Sheet _____ of _____

PROJECT _____ REPORT NO. _____

JOB NO. _____ DATE _____

ACTION TO BE TAKEN:

HEALTH AND SAFETY LEVEL CHANGES: _____No _____ Yes (explain)

HSO NAME/DATE:

PROBLEM RESOLUTION:

SPECIAL NOTES:

FOLLOW-UP TO BE FILED? _____ No _____ Yes (explain/attach)

FIELD CHANGE APPROVED: _____ No _____ Yes Initials: _____

Sheet _____ of _____

BY: _____ TITLE:

NON-CONFORMANCE/QUALITY CONTROL REPORT

Date: _____

Organization Name: _____

Initiator's Name and Title: _____

Problem Description:

_____
_____
_____
_____
_____
_____
_____

Reported To: _____

Corrective Action:

_____
_____
_____
_____
_____
_____
_____

Reviewed and Implemented by: _____